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EAR - NOSE - THROAT

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For Contents See Page 1.

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THE

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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

ANATOMICAL STUDIES OF DORELLO'S CANAL.*

DR. HARRIS H. VAIL, Cincinnati, Ohio.

My interest in Dorello's canal was stimulated by two recent cases of sixth nerve involvement at the Massachusetts Charitable Eye and Ear Infirmary, Boston, and on looking up the subject I was surprised to find very little mention in American literature on Dorello's canal. I found, however, an accurate description by Gradenigo[1], who apparently quoted from Dorello's original article.[2]

My abridged translation of Gradenigo's description of Dorello's canal is as follows:

"The *sulcus petrosus superioris* disappears 4 to 5 mm. proximal to the apex of the petrous portion of the temporal bone and there appears in its place a bony process of various form and strength the apex of which is directed upwards, inwards and forwards, in other words, toward the *processus clinoidei posticus*. This process, called by Dorello, the *spina sphenoidalis*, represents the continuation of the posterior lip of the superior petrosal sulcus. The superior petrosal sinus bends somewhat outwards from the spine anteriorly to run into the cavernous sinus.

Inwards from the spine in a somewhat deep plane, there is a depression corresponding to the apex of the petrous bone. Then there follows the petro-sphenoidal suture and finally the outer border of the lamina quadrangularis of the sphenoid bone, which exhibits a variable form and strength. In many cases this *lamina quadrangularis* describes the third of a circle in its course, the upper end of which is formed by the apex of the posterior clinoid process, in other instances it is divided into two parts through a small bony process which, somewhat below the posterior clinoid

*These studies were made possible through the kindness, assistance and advice of Dr. Harris P. Mosher. All anatomical sections and drawings were made in Dr. Mosher's laboratory at the Harvard Medical School. These studies are important from a clinical standpoint.

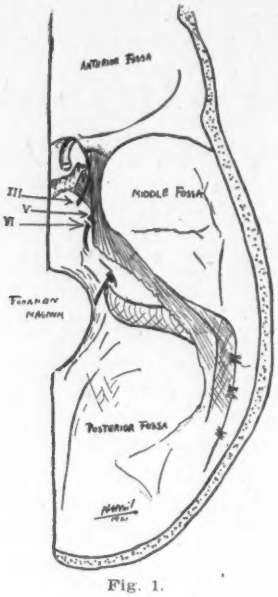
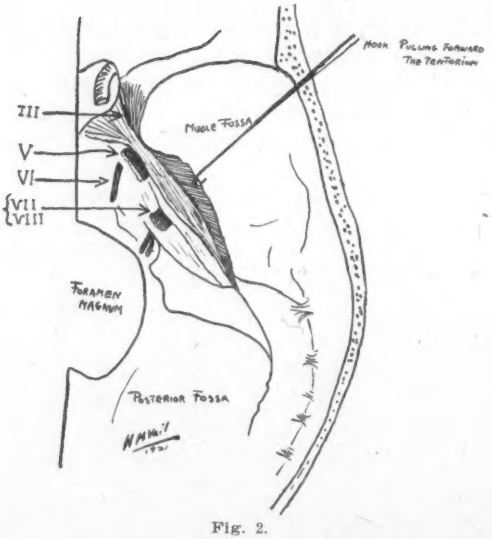

ANTERIOR FOSSA
III
V
VI
MIDDLE FOSSA
FORAMEN MAGNUM
POSTERIOR FOSSA

Fig. 1.


HOOK PULLING FORWARD THE TENTORIUM
III
V
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VII
VIII
MIDDLE FOSSA
FORAMEN MAGNUM
POSTERIOR FOSSA

Fig. 2.

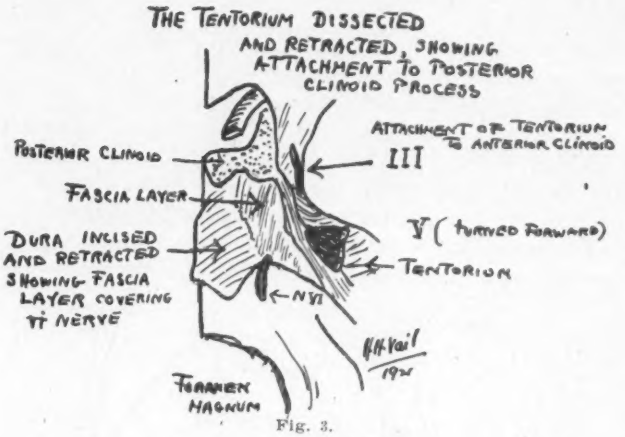

Fig. 3.

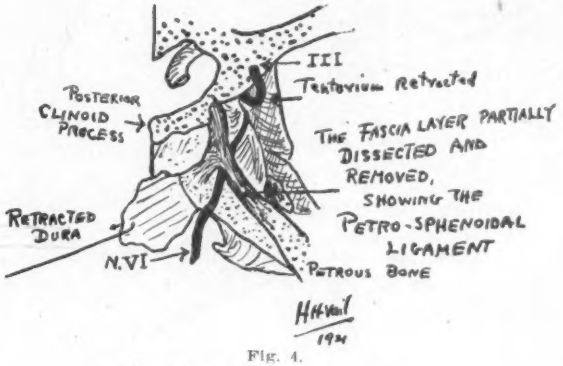

Fig. 4.

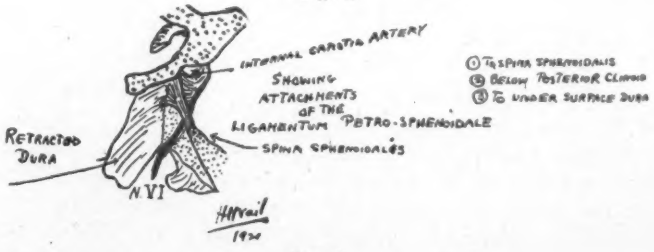

Fig. 5.

process, turns outwards and is named by Dorello "the accessory process of the posterior clinoid."

There results, from this arrangement, between the *spina sphenoidalis* and the *processus clinoideus posticus*, a sinus, the concavity of

which is directed superiorly and laterally. Aided by the presence of soft parts, this sinus is changed into an osteo-fibrous canal, particularly by means of a very resistant fibrous band which is called the *ligamentum petro-sphenoidale* (Grüber).

The deepest-lying bundles of the tentorium can be demonstrated in separate layers which form the *ligamentum petro-sphenoidale.* This ligament passes from the *spina sphenoidalis,* on the upper margin of the petrous bone, and is inserted into the outer lip and the posterior surface of the lamina quadrangularis of the sphenoid, somewhat below the posterior clinoid process at the site of the ac-

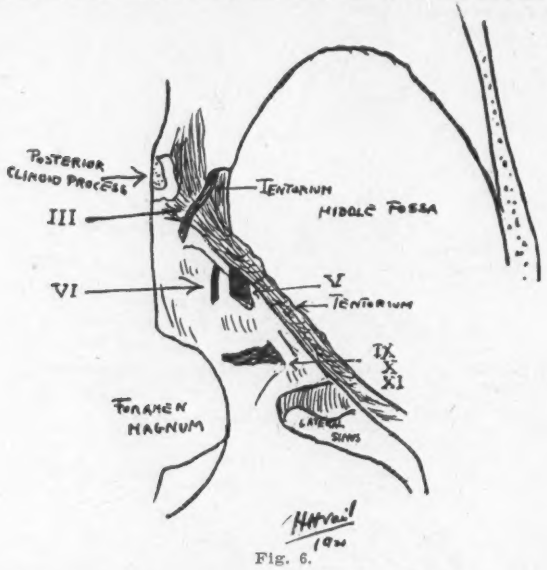

Fig. 6.

cessory posterior clinoid process, which becomes the bony origin of the *ligamentum petro-sphenoidale.*

Between the inner part of the upper margin of the petrous bone under the outer margin of the *lamina quadrangularis* of the sphenoid and the *ligamentum petro-sphenoidale* there is a small, approximately three sided space with the apex outwards and with the base directed inwards. In this space lie the abducent nerve and the inferior petrosal sinus where it empties into the cavernous sinus. The abducent nerve lies on the lower boundary of this area, more often near its outer angle, often confined to the angle which the *spina sphenoidale* makes with the upper margin of the pyramid of

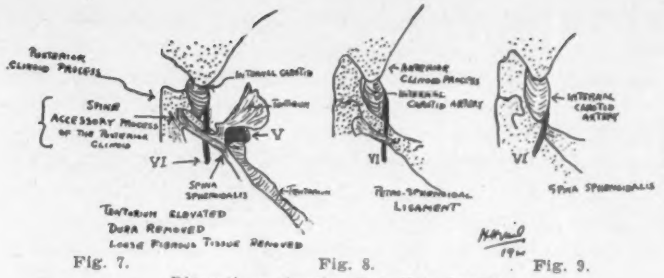

Fig. 7. Fig. 8. Fig. 9.

Dissections showing Dorello's Canal.

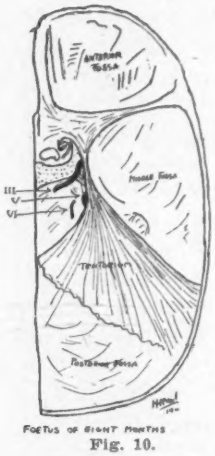

Fig. 10.

Fig. 11.

Fig. 12.

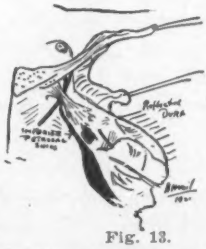

Fig. 13.

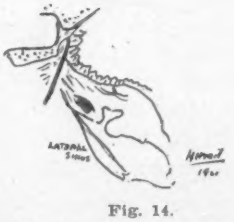

Fig. 14.

Fig. 13. Showink fan-like attachment of petro-sphenoidal ligament on the spina sphenoidalis and extending on to the petrous bone as far as the internal auditory meatus.

Also showing course of the inferior petrosal sinus and its relation to N. VI in Dorello's Canal.

Fig. 14. Poorly developed spina sphenoidalis.

the petrous bone which at this point is somewhat flattened from above.

The inferior petrosal sinus at first passes very sharply from behind forwards, and from outwards inwards, until it reaches the abducent nerve which likewise passes from behind forwards, but from inwards outwards, about a centimeter below the apex of the

Fig. 15.

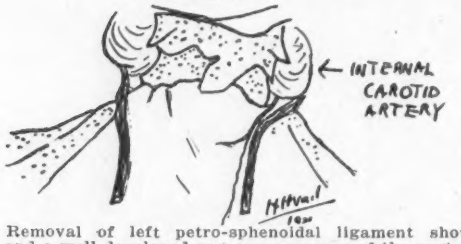

Fig. 16. Removal of left petro-sphenoidal ligament showing spina sphenoidalis and a well developed accessory process of the posterior clinoid. On the right petro-sphenoidal ligament is shown. A small artery medial to the N. VI is shown.

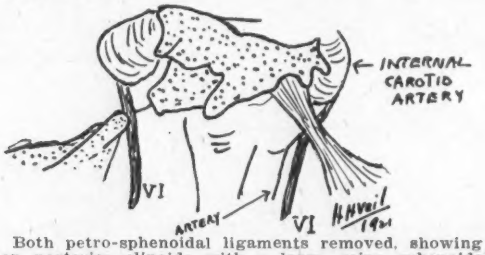

Fig. 17. Both petro-sphenoidal ligaments removed, showing numerous processes on posterior clinoids with a large spina sphenoidalis on the left and a poorly developed spina sphenoidalis on the right. The small artery medial to N. VI in Dorello's Canal is shown on the left.

pyramid, directly before penetrating into the dura mater. After the coming together of both structures the direction of the sinus is straight, it approaches the sagittal plane and finally lies over the nerve to pass with it into *Doredo's canal.* In the canal the relations differ, depending on the situation which the abducens occupies. When the abducens occupies the outer angle of the canal,

the sinus lies on its inner side; but when the location of the abducens is more towards the midline, the sinus lies above it to cover the nerve everywhere excepting on its under side. Upon leaving Dorello's canal the abducent nerve makes a slight bend and enters the cavernous sinus where it now lies in near relation to the carotid artery."

The writer's anatomical studies were from eight specimens including one fetus of eight months. The existence of the spina sphenoidale, ligamentum petro-sphenoidale and the relations of the nervous abducens were all demonstrated. Variations in the spina sphenoidale were found. These are best seen in the drawings herewith presented.

One case with both sides dissected showed a well developed spine on the left and a poorly developed spine on the right side. The petro-sphenoidal ligament was present in all cases and could be easily dissected. There was a thin layer of dura, which seemed to cover the ligament and blend with it and the surrounding dura.

On well injected subjects, a small artery running medial to the nerve was found. This artery originated from the internal carotid and ran backwards over the basisphenoid under the dura where it was lost near the foramen magnum.

The diagrammatic drawings herewith submitted (Figs. 1-17) are tracings of the original specimens, and show various stages of the dissections.

The following layers of tissue were encountered in the dissection; from above:

1. Tentorium. 2. Dura mater. 3. Thin fascia adherent to dura and underlying structures. 4. Petro-sphenoidal ligament. 5. Loose fibrous sustentacular tissue filling Dorello's canal. 6. In Dorello's canal: Artery, medial to abducent nerve, inferior petrosal sinus, superior to abducent nerve, abducent nerve, laterally. 7. Floor of the canal formed by the periosteum covering the bone.

Dorello's canal, affording passage for the sixth nerve, its accompanying artery and inferior petrosal sinus, becomes an exceedingly important anatomical structure in certain pathological states where inflammatory swelling may readily cause the trunk of the nerve to be inflamed or compressed; thus producing abducent palsy.

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1. GRADENIGO, C.: Uber die paralyse des nervous abducens bei otitis, Archiv. f. Ohrenheilk, 74, 1907, pp. 149-187.

2. DORELLO: Atti della clinica ot. laring .di Roma per l'ann, 1905, Tipografia Campidoglio, Roma, p. 170, in Gradenigo's article.

24 East Eighth St.

THE OPTIC NERVE IN SINUS DISEASE.*

DR. COLMAN W. CUTLER, New York.

The chief function of the ophthalmologist in the group of cases under consideration is to make a diagnosis, and the most important symptoms which contribute to that end are the variations in the blind spot and its neighborhood. It is well known that the blind spot of Mariotte, first described in 1688, corresponds to that portion of the fundus which has no visual elements, being occupied by the optic nerve as it enters the eye. At its edge the first or marginal visual cells of the retina are connected with the peripheral fibres of the optic nerve. These, as the nerve passes back through the orbit, lie next to its sheath, which is in contact with the bony wall of the optic foramen and the walls of the posterior ethmoidal and sphenoidal sinuses, which, as Onodi, Loeb and others have shown, are so variable as almost to defy description. These variations in bony continuity and thickness are sufficiently familiar.

It is obvious, therefore, that an inflamed ethmoidal or sphenoidal cell may be and often is a cause of inflammation in the sheath of the optic nerve and of an interference with the function of its peripheral fibers either by pressure or oedema. This is manifested by a loss of function in the portion of the retina supplied by these fibres and the production of a peripapillary scotoma. Van der Hoeve's symptom as it has been called, because he was one of the first to give it its proper significance and to publish a group of cases (Arch. of Ophthal, 1911, p. 30), showing conclusively its importance as an early and delicate indication of disease of the posterior nasal sinuses. Since this paper, and that by de Klein (Gr. Arch. 75, p. 373, 1910) there have been frequent additions to the literature and so many cases have been reported and carefully analyzed that it would seem futile to add to the number. Von Graefe called attention to the importance of enlargement of the blind spot in 1856. Prof. Fuchs mentions a striking case of retrobulbar neuritis cured by operation on the posterior nasal sinuses, which illustrates the insidious nature of the disease (Text-Book of Ophthalmology, 5th Amer. Ed., p. 826). Meller, Hajek, and others recently, in Vienna, have considered the subject at length, and many excellent papers, by Gradle, Posey, Bordley, Thomson, Stark, Ellet, Vail, and others, have been published in this country.

*Read before the Joint Meeting of the Section of Ophthalmology, Rhinology and Laryngology of New York Academy, Oct. 26. 1921.

The subject is not exhausted, however, for as there has been no pathological material, and as the points of observation differ for the rhinologist and for the opthalmologist, it is natural that there should be divergencies to reconcile and that a line of approach should be sought by which the technical skill of the rhinologist may be directed by the examination of the opthalmologist, unless the rhinologist will take time and pains to make the delicate tests on which the diagnosis depends.

The divergence alluded to may well depend on the fact that the rhinologist is asked to perform a difficult operation and that the patient is urged to submit to it, even where the nose may show no indications for such an operation and the vision be so slightly impaired as hardly to attract the notice of the patient. Nevertheless, this slight impairment, the enlargement of the blind spot, is one of the most important early signs of disease brought forward in recent years. It is important because it shows the presence of disease, often latent, of the posterior nasal sinuses which, if neglected, may lead to permanent injury to the optic nerve, and blindness.

There can be no doubt that a focus of infection in an enclosed cell may cause more serious trouble than blindness. The statistics of sphenoidal complications show, according to St. Clair Thompson, Dreyfus, and Onodi, many cases of grave intracranial disease. It is probable that the complications of operative procedure would also be impressive and a recent article by Dr. Cushing deserves serious consideration, although his statements have no direct bearing on the plea for an early diagnosis and for conservative treatment which is stressed in this paper. It may be said in passing, that choked disc, or papilloedema, is not a characteristic symptom of the form of retrobulbar neuritis under consideration, although cases have been reported.

May I refer very briefly to the importance of the differential diagnosis and to some of its difficulties: If the blind spot is enlarged and there is no other defect of the central portion of the field, it is probable that there is disease of the posterior sinuses, excepting, of course, the diseases of the eye that are easily detected by the ophthalmoscope, myopia, with its changes around the disc, opaque nerve fibres, choked disc, and glaucoma. I have seen one case of choked disc, +2D. and +3D., in which the blind spots were normal. It must not be forgotten that three of the symptoms of sinusitis—pain, sluggish pupil and paracentral scotoma—may occur in glaucoma and that they may be present before the ophthalmoscopic picture is pronounced.

If the patient is seen later and the scotoma embraces the point of fixation as well as the blind spot, we must think of retrobulbar neuritis from other causes.

In disseminated sclerosis the characteristic symptom is a central scotoma with, at a later stage, a slight pallor of the optic disc. Shumway (Ophthal Record, 1915, p. 386) reports a very interesting case in which a patient with retrobulbar neuritis in one eye, with central scotoma for colors, and with undoubted posterior ethmoiditis, improved under treatment of the nasal condition, but later the vision grew worse. A year later he developed symptoms pointing to a diffuse nervous disease and in three years disseminated sclerosis was clearly defined. The etiology of disseminated sclerosis is vague, but the pathology suggests the presence of toxins and their action on the arteries leading to proliferation of connective tissue and the degeneration of the medullary sheaths, but with preservation for a considerable time of the axis cylinders. Oppenheim and others mention the acute infectious diseases and influenza as causes and it is fair to assume that septic foci may play an important part. This was first suggested by Shumway and has also been urged by Stark (*Journal A. M. A.*, Aug. 27, 1921), as a reason for considering posterior sinusitis as a cause or a starting point of disseminated sclerosis. It is well known that the lesion of disseminated sclerosis may be at any point in the nerve trunk and its manifestations may be most varied. As a rule the symptom is a central scotoma. I have not found in the literature any instance in which the peripapillary scotoma occurred as an early symptom. This may prove to be an important point in the differential diagnosis. In most cases of disseminated sclerosis the temporal halves of the optic nerve become slightly pale in the course of the disease. In *sinus neuritis*, if I may use the term, this is not an early symptom, although it occurs in the severe or neglected cases where atrophy ensues.

In toxic amblyopia from tobacco and alcohol, it is well known that the blind spot may be enlarged, but the defect much more frequently begins as a central scotoma, the primary lesion being in the ganglion cells of the macular region of the retina.

Scotomas, paracentral in type, generally bitemporal, have been observed in pituitary lesions. In an admirable paper De Schweinitz and Holloway (Section on Opthal, A. M. A., 1912, p. 28) classify the small central and paracentral scotomas which occur usually, but not always, in the temporal fields in pituitary disease (Zentmayer's case of acromegaly had small binasal scotomas), and which

seem to antedate the gross defects in the visual field. In none of the cases mentioned was the blind spot enlarged.

In Dr. Foster Kennedy's well known paper on tumors of the frontal lobes with central scotoma and contralateral choked disc, central sectoma is explained as a result of pressure by or through the third ventricle on the optic nerve, causing atrophy of the papillomacular bundle. Dr. Verhoeff, in his discussion of the paper by de Schweinitz and Holloway, mentions a case in which he found, at autopsy, the papillomacular bundle completely degenerated by the pressure of the sclerosed internal carotid on the optic nerve at its exit from the optic canal. This may explain the case of Birch Hirschfield, in which the same bundle was degenerated in a case of tumor arising from the sphenoidal sinus, which compressed the nerve. It is well known that organs and tracts that are most active functionally, are most vulnerable and it is surprising that this susceptible bundle of fibres escapes as frequently as it does in sinus neuritis.

The relations of the branches of the posterior central vein of the optic nerve, which come from the sheath of the nerve and the neighborhood periosteum to form a central vein in the canalicular portion of the nerve first described by Vossius (Gr. Arch. XXIX) may also account for the association of central scotoma with peripapillary scotoma in disease of the accessory sinuses, as has been stated by Gradle (Annals of Ophthal, Oct., 1916), although I cannot wholly accept his statement that "the anatomic relations of the sphenoid and ethmoid cells to the optic canal are immaterial when it comes to a question of optic nerve involvement in accessory sinus disease."

In a paper by Dr. Hiram Woods (Am. Ophthal. Soc., 1915, and Ophthal. Record, Nov., 1915), entitled "Ocular Phenomena Accompanying Three Cases of Gastro Intestinal Disorder," the author reviews the subject judicially and depicts the varying paracentral scotomas which accompanied intestinal stasis. The "remote results of perverted metabolism," as he says, is a far-reaching problem. I need not refer to the well known work of Dr. de Schweinitz on this subject.

Enough has been said to serve as a warning not to assume that any case of disease of the optic nerve, with scotomas central or paracentral, is caused by disease of the accessory sinuses, except the most obvious ones, without a careful examination by a competent internist, with due regard for the neurological possibilities.

In the diagnosis of this form of retrobulbar neuritis, or sinus neuritis, which should not be called axial neuritis, peripapillary scotoma is of more value than minor changes in the fundus.

It is not easy, even for one who is using the ophthalmoscope constantly, to estimate the significance of hyperemia or variations of vascular fulness. Even slight striation of nerve fibres at the edge of the disc is not always convincing as a sign of disease, unless it varies from day to day or unless the eyes differ.

A careful observer will note in many normal eyes a veiled nerve edge, especially in young people and in some refractive conditions. Gowers said that the color of the optic nerves changed as much as the complexion, and in his classical work on Medical Ophthalmoscopy called attention to the error of mistaking physiological appearances for slight degrees of inflammation.

I would not decry the use of the ophthalmoscope; it is a matter for sincere congratulation that this means of diagnosis has become of general use, but in these cases it has less value than the perimeter or, better, the campimeter, which Peters has made available. I would also like to recommend the admirable book by Dr. Peters, "The Principles and Practice of Perimetry."

There are a number of methods of measuring the field of vision of the central portion of the retina, from the stereoscopic method of Haitz, the slate of Bissell, and the magnet screen of Gradle, to the simple flat surface at a fixed distance, a blank wall if need be, and there is little choice between them. The main thing is that one should become familiar with some method of examination, until he knows the normal conditions and can detect the slightest variations from the normal. Then successive examinations of a given case will have a significance and will furnish a trustworthy guide as to the variations of congestion of the posterior sinuses and the effects on the optic nerve.

It is important to have a large series of examinations of normal eyes so carefully done that normal standards may be established. There is some variation in the normal as regards the size and shape of the blind spot and less frequent variations in its position. These variations may be called physiologic, or they may in some cases be due to previous or latent nasal disease, and in a number of eyes which I have examined in patients who have had recurrent "colds" with headache, such fluctuations have been found more frequently than was expected. It would be absurd to say that such patients must have vigorous surgical treatment, but they do require attention

to their nasal hygiene and an occasional re-examination of the blind spot, to determine whether its limits remain stationary.

Because of the variations and uncertainties of colors, I use a neutral gray object 5 mm. in diameter at one meter, or a smaller object with the campimeter at 25 cm. I have increased the distance suggested by Peters in order that the size of the blind spots should be larger.

The greatest value of the test is shown in successive observations and it is extraordinary how delicate it is and how the blind spot will vary from day to day with the variations of the disease. For this purpose it is convenient to attach a sheet of paper to the campimeter of Peters, on which repeated observations are recorded, thus saving the time needed to transcribe the record to a chart.

To select normal cases the simple confrontation test, by comparing the patient's vision at the fixation point for colors and at the blind spot, with one's own, is useful, but this needs care and can only be considered a first test, as no record is made and no measurement of the size of the scotomas. The confrontation test can be used for the periphery more easily, as Dr. Holden has suggested, but the perimeter cannot be dispensed with, as Dr. Cushing has shown.

It is of the first importance to simplify the process as much as can be done without sacrificing precision of test and records, if it is to be of general use. In other words, it is a clinical and not a laboratory test. Fatigue of the retina must be avoided, and uncertain fixation following too prolonged a test. In an average case the test can be made, after a brief training of the patient, in five minutes or less. Pressure on the other eye, by too tight occlusion by finger or bandage, must be avoided. Fixation should be accurate, controlled by the observer standing in front of the patient, and the distance of the eye from the screen maintained with care, as a slight deviation, especially at 1 m., leads to serious error. It is necessary to mention these apparently obvious points in technique if this valuable method is to be utilized, as it deserves to be, not only by the ophthalmologist but by the rhinologist and neurologist, although it is probable that few who practice one specialty now consider themselves master of all.

Van der Hoeve's symptom (locus cit) can be considered positive when: 1. The scotoma for colors is considerably larger than for white. (I have suggested that the use of a gray object suffices, but recourse should be had to colored objects in doubtful cases). 2. When the extent for white and colors is decidedly

greater than normal (or where the size of the scotoma is greater in one eye than in the other). 3. When the size of the scotoma changes in the course of the disease. This last indication is of the greatest importance.

The occurrence of a central scotoma, as in the axial neuritis of toxic amblyopia, is not the rule in sinus neuritis, although it is found occasionally at an early stage. It suggests an extension of the defect from the region of the blind spot to the fixation point, which, as has been said, may be due to pressure from the surrounding oedema or to infiltration of the nerve from the sheath, thus affecting the delicate central bundle of fibres which supply the macula, or the central bundle may be affected by the extension of the disease through the veins from the sheath of the nerve which empty into the posterior central vein of Vossius.

The enlargement of the blind spot may exist for a long time as the only defect in the visual field.

Van der Hoeve and de Klein examined many patients with disease of the antrum, frontal and anterior ethmoidal cells, and found the blind spot normal in all but one, in which there was pus in the antrum under pressure. In 59 cases of posterior ethmoiditis and sphenoiditis, the symptom was found 54 times. The nasal treatment caused a decided improvement in all the cases, in most of them a complete cure. The number of cases with involvement of the optic nerve is larger than many observers would accept, but systematic observation of a large number of patients is not often made and it is exceedingly important to know whether so vital a tissue as the optic nerve is menaced; even if the inflammation is slight, progress may be rapid.

The enlargement of the blind spot does not entail radical operative measures in most cases if seen at an early stage, but patients thus affected should not be left to their own devices. Functional tests must be made, to determine whether the inflammation is stationary or progressive, and drainage established as promptly as possible.

The procedure in a suspected case is simple:

1. If the patient comes to the rhinologist with symptoms of posterior sinus disease, he must be questioned regarding vision and a test should be made with the campimeter if there is any suspicion of defect, also an ophthalmoscopic examination should be made or he should be referred to an ophthalmologist.

2. If he consults an ophthalmologist with the complaint of headache or blurred vision, careful inquiry should be made as to the

nasal discharge, the nature and location of the pain. Sluder says that in posterior ethmoidal or sphenoidal disease the pain is apt to be parietal or occipital. Headache is not always present, however, and when felt, it may be diffuse and throbbing. It is not, in my experience, a localizing symptom. Orbital tenderness, fleeting oedema of the upper lid, slight ptosis, insufficiency of accommodation and especially of convergence, and the pupil, should be carefully studied. The blind spot should be measured in all cases in which the symptoms are not obviously caused by eye strain from refractive errors or muscular defects, also small central and paracentral color scotomas should be sought.

It is only by such careful routine that the latent and early cases which are amendable to the simpler modes of treatment, can be detected, or the grave error avoided of reaching a hasty diagnosis when the cause may be remote.

Responsibility for operation must be shared by both ophthalmologist and rhinologist. If the simpler methods of treatment—irrigation, suction—do not succeed, and the blind spots remain large (and the examination must be repeated at frequent intervals), removal of a part of a turbinal, resection of the septum, or eventually opening of the posterior cells, must be faced. In acute and threateninging cases this must be done at once. In most cases it is possible to approach the decision by successive steps with the hope of avoiding the radical procedure.

In the acute cases of ethmoidal or sphenoidal disease, even though the vision is very seriously impaired, the recovery is often prompt and complete after adequate drainage and the prognosis is much better than in the neglected cases, in which the nerve has been organically impaired. A striking case was seen in 1910 with Dr. Culbert, reported by Dr. Frank Parker, in which acute sinusitis followed influenza with large blind spot on right side, rapid loss of vision, nerve edge blurred. An operation by Dr. Culbert, opening the posterior sinuses, was followed by prompt relief of symptoms. Recovery of vision was slow, normal in two months. In a case seen with Dr. Monroe, Mr. F. P. G., age 34, headache, left eye blurred for one week, large blind spot, relative central scotoma for form and colors. Vision: O. D. 20/15, O. S. 20/40. *Nerve slightly pale;* pupil large, sluggish. Pain on pressure of eye backwards. Dr. Monroe found nostril obstructed by septum and turbinate, pus. Immediate operation on septum, turbinal and ethmoid. Recovery in two weeks with normal blind spot and vision.

It is fair to assume, then, that the cases in which a large scotoma, with loss of central vision, accompanies the peripapillary scotoma with rapid fluctuations in function and prompt recovery after treatment, are the result of oedema and pressure, and not of a true neuritis, certainly not an axial neuritis as in the toxic amblyopia of alcohol and tobacco and other chemical poisons, when recovery is slow and often incomplete.

An important group of cases includes those in which there are no symptoms except the peripapillary scotoma. As a rule these are not urgent, but the following case is instructive: Mrs. M., age 26; November 24, 1920, the left eye was blurred on waking; general health good, no history of nasal disease; eye appears normal; fundus normal. Dec. 2: Vision: O. D. 20/15, O. S. 20/40. Left pupil larger, reacts sluggishly. Pain on pressure backward and referred to orbit. Large ill-defined scotoma covering region of blind spot to fixation point, with small absolute scotomas above and below. This varied daily. Periphery normal. Dec. 13: Vision O. S. 20/70. Nerve slightly paler. Dec. 15: Dr. Coakley found the nose normal. The radiograph, an excellent picture taken at an unusual angle from below by Dr. Law, showed a faintly cloudy posterior ethmoid cell. Dr. Coakley opened and irrigated the posterior sinuses. Dec. 17: Vision O. S. 20/50. Dec. 20: Vision O. S. 20/20. Dec. 31: Vision O. S. 20/15. The scotomas vanished and the blind spot became normal. It was unfortunately impossible to repeat the radiograph. Jan. 20: Vision O. U. 20/15. Pupils normal; fundus normal.

The operative procedure was exceedingly simple. As in others of these cases where no pus is found, the simple opening of certain cells seems to suffice. The local blood letting (although there is little or no hemorrhage), drainage, even though there is no visible discharge, ventilation of an enclosed cell, have been suggested, but an attempt at explanation is not justified without some basis of fact. I have seen several similar cases and others are reported. In these two cases slight pallor of the optic nerve was noted with small vessels—a suggestion of ischemia—with return to normal after recovery. In some cases the nerves have been slightly blurred with full vessels; more often the fundus has been normal.

In some cases of sinus neuritis the nerve fibres may suffer and recovery be incomplete, but the resistance of the nerve to the toxemia may be surprising and recovery may be almost or quite complete, even if blindness is complete, as in a case reported by Jung (Gr. Arch., 74, p. 366), in which *both* eyes were blind, pupils wide, immobile, optic nerves normal. The duration of blindness is not

stated, but after treatment with adrenalin, and suction was commenced, it was ten days before perception of light returned. Secretion was profuse. No operation was performed. Vision improved gradually and in two months it was one-third of the normal. Pupils normal. Optic nerves slightly pale. An interesting case that I was able to follow for three years with Dr. Culbert shows the results of persistence in treatment in chronic cases. Frank C., age 12, chronic posterior sinusitis; both eyes affected, nerve blurred at upper and lower margins; blind spots much enlarged at various times and small paracentral scotomas appeared and disappeared. Vision, 20/40 to 20/30; pupils normal. General history and examination negative. The persistence of the symptoms and the failure of conservative measures to relieve the condition, led Dr. Culbert to straighten the septum and open the posterior sinuses on both sides. Much pus was found. The headaches subsided, the blind spots gradually became normal. The boy is now at college, six years after the last operation, with no nasal or ocular symptoms. This case deserves a more extended study, because of the unusual changes in the field, the persistence of the symptoms, and the return to normal.

We have no pathological material which would aid us in classifying these cases of retrobulbar neuritis, but it is apparent that the pyogenic bacteria or their toxins may bathe the sheath of the nerve and possibly infiltrate it, and cause interstitial neuritis, but do not promptly attack the nerve fibres. In two cases there had been sinusitis for some time. I saw them first when the disease was advanced. The diagnosis was made by competent rhinologists. Careful physical examinations gave no indication of other disease, but in spite of well directed operative efforts, the nerves have become atrophic; in one case the atrophy is bi-lateral and suggests toxic amblyopia or disseminated sclerosis, but as yet without other symptoms. It is possible that earlier operation would have been more successful or that the diagnosis was at fault. The operation was justifiable under the circumstances and the patients are none the worse for it.

The plea in this paper is for watchfulness on the part of the rhinologist and ophthalmologist, for an early recognition of the disease, chiefly by an examination for Van der Hoeve's sign or peripapillary scotoma, and for prompt but conservative treatment, so adapted to the degree of infection and so co-ordinated with campimetric examinations, that the unfortunate effects of posterior sinusitis on the optic nerve may be avoided.

Let us see what conclusions seem justifiable:

In a number of cases of disease of the posterior sinuses the optic nerve is involved; it is probably a small percentage of the whole, depending on the presence of pus in the cells or on the presence of granulations or polyps in an enclosed cell (for free pus is not always found), and on the degree of protection afforded by the bony wall dividing the posterior cells from the optic canal; there are enough cases in which the optic nerve is involved to make the study of the subject, and the careful examination of all suspected cases, an important part of the routine of the ophthalmologist and of the rhinologist. The hyperplasia of bone leading to obstinate recurrences (Wright and Sluder) is an important and interesting feature, with which I am not competent to deal.

Cases with outspoken symptoms in eye or nose, or both, are comparatively easy to diagnose and the results of treatment have been in many instances brilliant, but to this statement there are exceptions. The nerve sometimes goes on to atrophy in spite of well directed efforts to relieve the empyema. I have cited two such cases, but in these the diagnosis may have been at fault or the treatment too late.

In the larger proportion of the cases that come to the ophthalmologist the symptoms are not acute or urgent, but merely suggestive. The blind spot is enlarged. It may vary slightly with recurrent colds. There is some headache, convergence is difficult, and the pupil on the affected side may be larger, but this is not an early symptom. There is often tenderness on pressing the eye backward. Vision and fundus are normal, and the patient is not seriously hampered. The rhinologist is apt to report that the nose is narrow, possibly a deflected septum or swollen turbinal, but no pus from ethmoid or sphenoid. In such cases the X-ray is usually inconclusive, but it may offer corroborative evidence.

These cases are usually chronic and respond less readily to suction and other conservative methods. They are the crux of the problem. They are not dramatic, but like all borderline cases in medicine, they should enlist our efforts as much or more than the others which promise a prompter result. One should not insist on an operation, and if one did, it would probably be refused, and yet there is evidence that there is an enclosed cell which is a potential source of danger. In a number of such cases I have records of vision, fundus and blind spots, and I hope at some future time to decided which of them should have been operated on and which happily escaped. It is needless to say that all doubtful cases have

been advised to consult a competent rhinologist. The cooperation of the rhinologist and the ophthalmologist should be closer, and it is needless to repeat that the broad general aspects of each case should be kept constantly in mind. The problem in these chronic cases should be, not the operation, but how to avoid it by hygiene and development of the nasal cavities. Every case is an individual problem; there can be no routine way of dealing with them. The diagnosis enlists all our resources. The education of the patient in the care of the nose is important. The verdict for operation must rest largely on the results of the ophthalmological examination.

24 East 48 Street.

CASE OF CHRONIC PURULENT OTITIS MEDIA COMPLICATED BY PERISINAL AND EXTRADURAL ABSCESSES, WITH SEVERE MENINGEAL SYMPTOMS.*

DR. D. S. DOUGHERTY, New York.

The patient, a well developed girl, 13 years of age, was brought in by the ambulance, March 10, 1921, about 4 p. m.

Past History: Had had no serious illness. Had had earache in right ear followed by an intermittent, foul smelling discharge about two years ago; this discharge had obtained for several months, but of late seemed to have disappeared. Had had tonsils and adenoids removed at a special hospital on March 1. For past three week has been restless in her sleep. Menstrual periods not yet begun.

Present Illness: Began March 8 with pain in right ear and behind ear; a sudden profuse discharge from canal; headache and dizziness. Thirty-six hours later the discharge ceased and patient's condition became rapidly worse. There was considerable fever, headache involving the frontal and greater part of the right side of

*Read at the Section on Otology, New York Academy of Medicine, Nov. 11, 1921.

the head; inability to sit up or stand unassisted and blurred vision. She had vomited once, the vomiting being projectile and the vomitus being greenish yellow in color, of a semi-fluid consistency with no characteristic odor.

Examination on Admission: Patient suffering most excruciating pain in the head; at times irrational; screaming almost continuously; unable to answer questions regarding her condition; her attention being entirely centered upon her head; pupils contracted but of equal size; photo-phobia; respirations rapid and irregular, thirty to minute; pulse 64; temperature 105.2.°

Examination of chest and abdomen, negative. Mouth foul, tongue heavily coated; teeth, Hutchinson in type.

Examination of ears: Left, normal. Right, small amount of sero-purulent discharge from auditory canal, reddish gray in color and of foul odor. No induration over mastoid; exquisite tenderness elicited by slight pressure over tip of mastoid and over squamous portion. Reflex tests, negative. Leucocytes, 19,200. Polys, 92 per cent.

Patient prepared for operation and operated upon under gas-ether anesthesia at 9 p. m. by Dr. Dougherty, Attending Otologist, assisted by Dr. Schiller, Assistant Otologist and Dr. Burns, House Surgeon.

The cortex was found to be of an ivory-like hardness and the whole mastoid process extremely sclerotic, the cells being apparently obliterated. A small quantity of pus was found in the antrum and seen exuding from a necrotic point in the roof, from the bony casing of the sinus and from a point in the inner table between the sinus knee and the antrum. Removal of the bony covering of the sinus revealed the sinus grove filled with pus, the sinus flat and without pulsation and pus oozing from under the inner table at the edge of the grove. The tegmen antri and a section of the inner table extending from the knee of the sinus to the antrum were now removed. The exposed dura was discovered to be covered with pus, small excoriated areas appearing under the points where the bony covering had been necrosed. Upon being relieved of the pressure, the sinus assumed its normal appearance except for the presence of considerable granulation over the knee.

The wound was left open being lightly packed with iodoform gauze.

While the patient was still under the anesthetic a lumbar puncture was done, the fluid coming away under pressure and being cloudy in appearance.

The patient made an exceedingly uneventful recovery, having a normal temperature twelve hours after operation and being up and about the ward on the eighth day; left hospital in four weeks, wound healed and ear dry; at present is in good health and attending school.

Laboratory findings: Urine—sp. g.—1030, acid, sugar and albumen negative, no blood or pus cells, a few epithelial cells. Blood—R.B.C.—5,125,000. W.B.C.—19,200. Polynuclears 92 per cent, lymphocytes 7 per cent, eosinophiles 1 per cent. Spinal fluid, drawn at time of operation—Globulin absent; sugar and albumen negative; cells 550 c.mm. Smears show many polymorphonuclear cells and many extracellular gram positive organisms, probably streptococci.

Later reports: Culture from pus shows mixed infection, mainly staphylococci, a few streptococci. Culture from blood and from spinal fluid negative. Blood: Wassermann, negative; spinal fluid Wassermann strongly positive.

The points of particular interest to my mind in this case are: The probable presence of an unrecognized mastoiditis at some earlier period; the extensive area of the extra-dural suppuration; the intensity of the meningeal symptoms and their rapid subsidence upon operation; the marked and almost immediate drop in temperature; the fact that the Wassermann test of the blood was negative and of the spinal fluid positive, most authorities holding the converse in cases of congential lues; and the strong probability that a few hours delay in operating would have resulted fatally.

At a regular meeting of the Medical Board of Riverside Hospital, held on June 27, 1922, the following resolution was adopted:

Resolved: Whereas, Dr. Henry Lowndes Lynah has completed his brilliant career as laryngologist at Riverside Hospital, we are moved to express our sense of profound loss of his fellowship and of admiration for the daring and skillful work which he undertook for our patients. His reputation, won to some extent by work performed at Riverside Hospital, reflected merit on this Medical Board.

Be it resolved, that a copy of these resolutions be spread on the minutes and a copy published in the medical press, and that a copy be sent, as a token of our sympathy, to the members of Dr. Lynah's family.

DR. WALTER A. DUNCKEL,
DR. JESSE G. M. BULLOWA,
DR. GEORGE D. WOLF.

THE RELATION BETWEEN THYROTOXICOSIS AND TONSILLAR INFECTION.*

Dr. Louis E. Brown, Akron, Ohio.

Considering the amount of attention which has been directed toward infection originating in the tonsil, and also the extended study of disturbance of the thyroid function, it seems rather surprising that so little consideration has ever been given to the possibility of relationship between the two. It would seem almost inevitable, that whichever avenue of approach an investigator used, whether his interest were in the tonsillar condition, or solely directed toward a consideration of thyroid pathology, he would sooner or later arrive at a point where the two lines of investigation would intersect. Yet a careful search of the literature reveals comparatively few instances of any such occurrence.

The writer's interest was first aroused to the possibility of some interrelationship between diseased tonsils and disordered thyroid in the routine course of oto-laryngeal practice. The extensively reported experiments of Kimball and Marine upon the public school girls of Akron and other Ohio cities have recently called the attention of the medical profession all over the country to the fact that goiter is especially prevalent in this particular section of the United States. In common with the other medical men located here, the laryngologist sees many patients who present some degree of thyroid disturbance, the vast majority of those patients being adolescent girls, or young women not many years past puberty. As the writer's interest was always in the indications of the tonsillar situation, and the goiter was considered only in the general survey of the patient's health and physical condition, it was some time before the conclusion was thrust upon him that there could be any definite connection between the two.

This is unfortunate in view of the present inquiry, for much valuable and interesting data was allowed to go unrecognized and consequently unrecorded, which, if available at present, might be of great assistance in illuminating a rather obscure subject.

It was not until many patients—in the course of investigation of their general condition following tonsil enucleation—had reported

*Candidate's Thesis accepted by the American Laryngological, Rhinological and Otological Society.

decided improvement in the goiter itself, and an undoubted amelioration of its characteristic symptoms, that it became evident that these circumstances must be something more than casual coincidence. Nervousness had been greatly lessened and irritability was much less evident, pulse rate was markedly lower, and there had been a gratifying increase in weight. The thyroid enlargement in many cases had undoubtedly decreased, and the whole physical and mental condition was much benefited.

Confirmation of these observations came from another source—that relatively small class of patients who presented themselves for tonsil enucleation giving a history of previous thyroidectomy without any marked amelioration of the goiter symptoms. Relieved of their infected tonsils, these patients reported a complete clearing up of all the thyrotoxic symptoms which had persisted after the thyroidectomy.

The repeated occurrence of these cases so impressed the writer with their significance that he resolved to extend his researches outside his own practice, and find out—if possible—whether other men working along the same general lines, had had opportunities for making observations of similar character. With this purpose in view he prepared a brief questionnaire covering those points on which he most desired additional information, and sent it to twenty-eight practitioners whom he believed to be so situated as to be able to supply the information he was seeking. Surgeons, internists and ear, nose and throat men were represented in the list, the idea being to get as broad a range of opinion, and as many different points of view as possible.

The response to the appeal was very gratifying. All the letters were answered, and although the majority modestly disclaimed possessing any information which they deemed valuable, the recipient of their kindness is compelled to differ with them. At the time the questionnaire was sent out the writer had found very little in the literature which had any bearing upon his hypothesis, and although further search revealed a number of records and reports of work along these lines, the personal communications still remain of the highest value and interest.

Of the twenty-eight men to whom inquiries were sent there were only six who felt unable to give any definite reply to the questions. Several of the remaining twenty-two were not in position to give exact answers to the questions as arranged in order, but the general observations and conclusions they did give were very valuable

and helpful. The results of the questionnaire may be summed up, using the different questions as headings:

1. *How many cases of goiter have you had in your practice, in which, according to the patient's history, the symptoms accompanying the goiter were apparently temporarily increased during an attack of tonsillitis?*

Thirteen replied positively that symptoms were always increased during an attack of tonsillitis; and but two had failed to observe any relationship between the two conditions. David Marine has often observed the phenomenon, but does not believe there is anything "specific in the reaction of these (goiter) cases to tonsil infection." Plummer, of the Mayo Clinic, is of the opinion that exopthalmic goiter "is sometimes aggravated by tonsillitis, while in other instances it is at least temporarily improved;" this answer, however, having "little if anything to do with the etiologic relationship of tonsillitis and exophthalmic goiter." Allen Graham calls attention to the fact that while tonsillitis undoubtedly aggravates both simple and exopthalmic goiter, the same phenomena have been observed in many other acute infections, "most notably tuberculosis."

2. *In how many cases, where adults presented an early stage of goiter, coincident with infected tonsils, was the growth of the goiter apparently arrested by the removal of the tonsils?*

All the replies to this question might be classed as "affirmative." Comparatively few were able to state an exact number of cases, but the consensus of opinion was undoubtedly that the removal of infected tonsils had a beneficial effect on all types of goiter. Dr. Crile states that "in general, fifty per cent are apparently arrested by the removal of any infection, whether it be teeth, tonsils, sinuses, etc." Allen Graham says that "it is unquestionably true that some patients who have both goiter and tonsillar infection are improved after tonsillectomy. This is strongly maintained by Dr. H. G. Sloan of this city (Cleveland, Ohio), who nevertheless recognized the importance of eradicating infection in the sinuses or any other focus, as well as the tonsils."

Albert J. Ochsner has seen many goiters arrested after removal of the tonsils, but in all of these cases the patients were directed to follow a highly specialized diet and were especially cautioned to drink only boiled or distilled water. Dr. Ochsner would, therefore, appear to consider the dietary regime as more likely to have effected the improvement. David Marine thought that while few, if any goiters were actually *arrested*, many were no doubt im-

proved by the removal of any focus of infection, while O. P. Kimball had "seen two cases of well advanced exopthalmic goiter cleared up entirely on the removal of very bad tonsils, plus the simple treatment of saturating the thyroid gland with iodine." In this connection it is interesting to recall the statement of Marine and Kimball, published last year[1], that of more than one thousand school girls who took iodine prophylaxis for a period of three years, only five showed an increase in the size of the goiter at the end of the period, and four of these five had enlarged and infected tonsils.

3. *How many cases, after a thyroidectomy, in which the symptoms persisted, were relieved by a tonsillectomy?*

A wide divergence of opinion was revealed by the answers to this question. Mithoefer, of Cincinnati, had never observed any such cases, while T. E. Carmody (whose figures are "only approximate") had seen two; J. M. Ingersoll of Cleveland estimated the number at about ten per cent of thyroidectomies, and James J. King of New York had an "impression" that one or two who were not relieved by thyroidectomy were relieved by subsequent tonsillectomy. While Crile was unable to give exact figures, he attributes the persistence of goiter symptoms after thyroidectomy to one of two factors: "1. Not sufficient thyroid removed. 2. Focus of infection has been overlooked." This is interpreted by the writer to mean that *if* the focus of infection *were* in the tonsils the goiter symptoms would continue so long as the tonsils remained unextirpated. J. A. Stucky of Lexington, Ky. on July 9, 1921 had seven cases still under observation where the usual symptoms persisted after thyroidectomy but "were relieved promptly by tonsillectomy." It is likely that Dr. Stucky may later be able to throw more light on this particular question. Several others had no data of any sort on which to base a reply to this question.

4. *How many cases of young girls at puberty, who have a beginning simple goiter, had their tonsils removed in early childhood, or at least before the symptoms of goiter were evident?*

The most of those questioned "fell down" on this question. "No data" was the reply of the majority. Dr. C. W. M. Poynter of the University of Nebraska considered it "particularly significant." He believes that "as long as we do not know what makes the tonsil susceptible to infection, we should begin by assuming that 'lowered resistance,' due to goiter acts, not in a specific way, but as any other devitalizing influence, as bad hygiene, etc." Wal-

lace Irving Terry of San Francisco thinks "it will be interesting to learn in a few years whether goiter with exopthalmus is less prevalent in young women who have had their tonsils removed in early life."

5. *In those who have not had their tonsils removed, how many were benefited or cured by a tonsillectomy?*

All who answered this question seemed to hold the opinion that in adolescent girls who were developing goiter, the removal of infected tonsils invariably had a beneficial effect on the thyroid condition. Dr. Crile says, "We feel that only very frank exophthalmic goiter patients are not cured by removal of focus of infection unless they also have thyroidectomy performed."

6. *Have you ever had a goiter case that also had infected tonsils, where, after a thyroidectomy had been done, the patient had no further tonsillar trouble?*

The only affirmative answer to this question was that of H. S. Plummer of the Mayo Clinic. All the rest answered: No, without any qualifications. The unanimity was decidedly striking.

7. *What per cent of goiters, in your opinion, are of toxic origin?*

This question was evidently somewhat vague, and consequently those who attempted to answer it, found considerable difficulty in making their replies satisfactory to themselves. Charles H. Major judged that about 40 per cent of the cases coming to his clinic are toxic. Allen Graham objected to the term "toxic goiter" as indefinite and "subject to various interpretations." In common with Ochsner, he feels that "the region from which the patient comes" is the most potent factor in the nature of the thyroid disturbance. The other replies estimated the number of toxic cases all the way from 50 per cent to "practically all." Marine thinks "relatively few exophthalmic goiters are of bacterial toxic origin."

Many of those questioned made valuable contributions to the discussion which were not directly included in the questionnaire. There is evidently a strong feeling, that treatment, especially the iodine therapy, so successfully administered by Marine and Kimball, or the special diet and regimen as advocated by Ochsner, have a much greater part in effecting cure or amelioration, than the removal of infection, in the tonsils or any other location. Terry believes that "focal infections play a considerable part in activating a hyperplastic thyroid, but unfortunately removal of foci of infection is not followed by many cures of the goiter." Marine re-

gards "most of the (goiter) cases as types of exhaustion as, for example, those following fright and prolonged worry," all acting "on the same mechanism within the body." He believes that "the suprarenal gland plays a very important role in the syndrome and it has long been known that this gland likewise plays an important role in infections." He adds that "one must bear in mind that the thyroid hyperplasia in goiter is accompanied by lymphoid hyperplasia irrespective of clinical associations," and this causes him to "seriously doubt that any cause and effect relation between lymphoid hyperplasia and thyroid states will be established."

Dr. Poynter sees "nothing in the juxtaposition of the tonsil and thyroid to warrant us in assuming a connection between them, either through lymph or blood channels." He thinks that if any relation exists it will be found to be through internal secretion, but adds that "a very large percentage of hypertrophied tonsils in conjunction with enlarged thyroids might be significant."

Emil Mayor wrote that while he was unable to give any exact figures, his experience led him to believe that "an early operation on the tonsils would have a very beneficial effect upon the (goiter) patient, retarding the growth, or even entirely preventing the further advance of a goiter that often is of toxic origin."

A careful examination of the replies, as a whole, would seem to lead one to the conclusion that most of these men have given little consideration to the possibility of an interrelation between infected tonsils and thyrotoxicosis. The consensus of opinion may perhaps be pretty fairly summed up in the words of Allen Graham who wrote:

"Regarding exophthalmic goiter, in the vast majority of cases neither on history or physical examination, can the tonsils be incriminated as the chief etiological agent, nor the factor that prolongs the syndrome, even granting that it (tonsillitis) might aggravate the symptoms when it occurs. On the other hand a considerable number of patients date the onset of their trouble from a previous systemic infection, not necessarily of tonsillar origin. Also a large number of cases develop in which the infection plays little or no part, so far as can be determined by history and examination."

The function of the normal tonsil is not fully known, indeed there is relatively firm ground under the feet of those who maintain that there is no such thing as a normal tonsil, inasmuch as practically each one removed can be proved to be more or less

pathologic. Anyone who has investigated the anatomy of the tonsils will immediately perceive how liable they must be to infection with all kinds of bacteria. The tonsils occupy an "open" position in the throat, that is, no food or air can find its way either to the stomach or lungs without first passing over these tissues. Moreover, deglutition opens up the tonsillar fossae in such a way that the mouth secretions continually come in contact with them. We know that the tonsil encloses a number of deep crpyts lined with highly sensitive epithelium. A cross section of the tonsil mass will disclose how these fossae, with their covering of columnar epithelium, reach far down, sometimes to the very root of the tonsil itself. Not infrequently one crypt communicates with others, and their delicate lining epithelium is directly in contact with the tonsil parenchyma, the chief constituent of which is mono-nuclear cells. Thus a great extent of absorbent surface is always open to infection, and in addition to this, the opening of a fossa is apt to become clogged during the progress of any inflammatory process, so that the infectious material which the crypt contains is sealed up within it. When we consider that the tonsil does not secrete, and has no avenue of elimination except through the mouth of the fossae, we can readily comprehend how this infective material must of necessity be gradually absorbed into the system[2]. Many years ago George B. Wood[3] demonstrated that bacteria will generate toxin in the crypts, and that if this bacteria is virulent, its first point of attack will be the cryptal epithelium. In the large majority of cases they gain access to the tonsillar parenchyma only after the toxins have destroyed the epithelium. When the bacteria have gained access to the tonsillar tissue, they find permanent lodgment only in the germinating follicules. The current in the interfollicular tissue tends to carry the bacteria toward the efferent lymphatics. Thus, a definite lymphatic connection may be established with many other parts of the organism.

During the war period the energies of the medical profession were so completely absorbed by the pressing problems of the battle area and evacuation hospital that all mere academic inquiries were laid aside and forgotten. To find anything bearing on a possible relation between thyroid and tonsillar infection it is necessary to search the literature which appeared before the world convulsion of 1914.

Up to the end of the nineteenth century the thyroid had received little attention as a possible factor in systemic disease. Its connec-

tion with simple and exophthalmic goiter, with myxodema and cretinism, was fairly well understood, but there had been comparatively few studies made of these conditions outside the regions where goiter was endemic. During the closing years of the century Roger and Garnier[4] published in *La Presse Medicale* and transactions of the *Societe de Biologie,* a series of papers on the thyroid gland, one of which dealt especially with the reactions of the gland to general infections, and the pathological changes taking place at such times. Thirty-three post mortem examinations were made, the material being taken from patients dying of such diseases as diphtheria, scarlet fever, cerebro-spinal meningitis, small pox and purulent staphylococcic peritonitis. These authors reported that the condition of the thyroid was about the same under all conditions, that neither the specific character of the infection, nor its virulence and duration seemed to make much difference in the condition of the gland under examination. Most of the lesions were characteristic throughout. The glandular hyper-secretion appeared less abundant in the diphtheria cases than in those of scarlet fever, but the diphtheria thyroids contained a greated number of desquamated cells, and the colloid material was more frequently altered. In one diphtheria case a parenchymatous hemorrhagic area was found in the thyroid.

These authors performed a number of experiments upon rabbits and guinea pigs, finding it an easy matter to infect the thyroids of these animals by injecting a culture into the center of the carotid artery, which had been previously ligated below the junction of the thyroid artery. The infection thus set up was practically identical with that observed in human subjects, although much more acute, and so brief in duration as to give little or no time for organic reactions to be established.

The conclusions drawn by these authors were that during the course of acute infections disturbances of secretion more or less profound, occurred in the thyroid "as in the other glands of the economy." After a period of hyperactivity, a period of diminution will follow or an alteration of function. Just as the liver at such times will secrete abnormal pigments, the thyroid will form colloidal material, atypical and peculiar to these conditions.

Roger and Garnier's investigations apparently attracted little attention in this country, and it was not until Billings, Rosenow and their co-workers began to publish the results of their researches on focal infection, that the possible relation of the thyroid to sys-

temic disturbances was brought to general notice in the United States. In his address on focal infection, delivered before the American Medical Association in 1914, Frank Billings[5] reported three cases of rheumatism, attended by acute tonsillitis and thyroiditis, attributing all three manifestations to a single focal cause. He went on to say that the interest of his clinic was aroused to the possibility of focal infection as a cause of goiter. He reported seven additional cases which "seemed to show that there is an infectious type of goiter with and without symptoms of exophthalmic goiter, which seems to be of toxic origin. The rapid subsidence of the goiter and the symptoms after the removal of the foci of infection in the jaws and tonsils, was a surprise." All of these patients gave a history of chronic tonsillitis. Dr. Billings ended by saying that to the list of acute conditions already known to be due chiefly to focal infection, we were now justified in adding several others including "certain infectious types of thyroiditis, with or without hyperthyroidism."

A year before Dr. Billings' address was made Clement F. Theisen[6] of Albany, New York, published some cases of acute tonsillitis complicated by an acute thyroiditis. These cases offer perhaps the best support which the present writer has been able to find in the literature of a close interrelation between infections of the tonsil and the thyroid. Theisen believed his cases to be of "particular interest from an etiological standpoint, as in all except one case, the inflammation of the thyroid gland occurred with or directly after attacks of tonsillitis. Two of these patients have each had two distinct attacks of acute thyroiditis, each time with an acute tonsillitis, and both have since developed well marked diffuse goiters." While Theisen does not wish to be understood as emphasizing the foregoing facts as important etioligical factors in the development of goiter, he feels that it is by no means impossible that the repeated inflammatory attacks to which the gland was subjected, may have, partly at least, been responsible for the subsequent chronic hypertrophy of the thyroid gland.

All of Theisens patients were young women. Briefly summarized, the cases were as follows:

Case 1: Age 20. Sore throat for several days before examination revealed a typical acute follicular tonsillitis. Thyroid enlarged and tender on palpation, the hypertrophy increasing during the course of the tonsillitis. The swelling of the thyroid had begun during the third day of "sore throat," and the patient stated that

the gland was not enlarged before the attack of tonsillitis. Under the usual treatment for tonsillitis, with an ice-coil about the neck, the attack subsided in about a week. Tonsillectomy was refused, and the next winter the patient again presented herself with a similar attack, "running the same course, and again developing with an acute tonsillitis. This patient came to the clinic at regular intervals during the next two years, and while there were no further attacks of acute thyroiditis, she developed a gradually increasing diffuse goiter. It is at least possible that etiologically there is a connection between her attacks of thyroiditis and the subsequent hypertrophy of the gland. *There is no doubt that the infection of the gland was each time caused by the acute tonsillitis.*"

Case 2: Age 22. Same history as preceding case. Patient was practically well in ten days, and was not seen again for about two months, when she came to the clinic with typical symptoms of hyperthyroidism.

Cases 3 and 4: 21 and 24 years old. Both stated that before the present attack they had no enlargement of the thyroid. One patient was just getting over a severe attack of acute tonsillitis, and the other was still having an acute attack (no mention of sequellae of hyperthyroidism in these cases.).

Case 6: Aged 19. Very severe acute tonsillitis which was followed by the development of acute thyroiditis. The attack ran the usual course and a year later another acute thyroiditis came on with an acute follicular tonsillitis. This patient has been under observation continuously, and has developed a well marked diffuse goiter, which started about six months after her last attack of thyroiditis.

Case 7: Aged 30. A very severe acute thyroiditis came on directly after an acute tonsillitis. "There was a good deal of dyspnea and dysphagia in this case, and within a few months after the attack, she developed a typical condition of hyperthyroidism."

In concluding this report Theisen remarks that he found very few cases recorded in the literature where acute thyroiditis occurred in conjunction with tonsillitis. A study of his case histories naturally suggests the possibility of overlooking the occurrence of thyroid involvement in acute tonsillitis. It seems reasonable to suppose that recurring attacks of tonsillitis might involve the thyroid, and eventually set up a chronic condition of hyperthyroidism, even if the thyroid symptoms were never sufficiently acute to be differentiated during the tonsillitis attacks.

Seven years ago Shurly[7] stated that his attention was called to the relation of the tonsils to thyroid diseases, "by the beneficial results of a series of tonsillectomies for the relief of recurrent tonsillitis and quinsy, attended by incipient typical and atypical Graves' disease. The prompt, permanent and prophylactic value of enucleation in this class of cases adds another definite indication to surgical procedure, which is given no attention in the literature. As acute and chronic tonsillitis and peritonsillar abscess are recognized as important etiologic factors in incipient exophthalmic goiter, tonsillectomy may then be classified as a prophylactic measure in our new and fashionable department of preventive laryngology."

The discussion which followed Dr. Shurly's paper brought out some interesting data on the relation of tonsil infection to thyroid disturbance. Greenfield Sluder of St. Louis stated that while the clinical relationship between the lymphoid ring and the thyroid gland was not clear in the minds of anatomists, it is an established fact that the lingual tonsil develops from the same bronchial arch, and in early foetal life there exists the thyroglossal duct which is closed early. It is sometimes found in the dissecting room, but the speaker had never been able to observe it in a living subject. He had observed marked improvement in goiters where all treatment had been directed toward the lingual tonsil.

Dr. George B. Wood of Philadelphia reported the case of a trained nurse who had recurring tonsillitis followed by exophthalmic goiter and hyperthyroidism. After removal of the tonsils the attacks stopped for six months, the goiter began to go down and the exophthalmos to disappear. Then followed a slight sore throat with a less severe attack of hyperthyroidism, and examination now revealed that the faucial tonsils had not been entirely removed, a small piece still persisting in the upper part of the tonsillar recess. When this was removed all symptoms of hyperthyroidism permanently disappeared.

Dr. Wood's explanation of this case was not by a direct relationship between the lymphoid ring and the thyroid gland, but rather by the presence of an infective process originating in the ring, which upset the metabolism of the body so as to produce goiter and hyperthyroidism.

Shamburgh of Chicago was of the opinion that the phenomena of thyroid disease suggested very strongly a condition caused by some focus of infection, as around the teeth, or latent in the faucial tonsils. This latter condition is often overlooked. When the

systemic condition develops in connection with a severe attack of acute tonsillitis, the tonsils are often suspected of being the focus, but if the infection is latent, and the patient does not complain of throat symptoms, the examiner may not think of the tonsils at all. Chronic tonsillar abscesses are frequently discovered in patients who give no history of "sore throat," and such abscesses are often unrecognized before the tonsils are extirpated.

Evans and his collaborators[8] made extensive observations on students entering the University of Wisconsin during the five years, 1910 to 1914, inclusive. Wisconsin being situated in the so-called "goiter belt," offers an excellent opportunity for researches on the subject here discussed. The tabulated results of these researches "afforded decided evidence of the actuality of a connection between nasal and throat affections, and the large occurrence of thyroid involvement. The recognition of the tonsils as a site of parasitism by *endameba gingivalis* (Gros) in the laboratories of the Universities of Pennsylvania and Wisconsin raised the question of a possible connection of this organism with the thyroid enlargements because of the evidence obtained of its part in the etiology of other conditions, for example, pyorrhea."

The authors emphasize the fact that in suggesting endamebiasis of the upper respiratory tract as possible causes of thyroid hyperplasia, they are not advancing these protozoa themselves as the specific producers of the toxins effective in producing the hyperplasia. If this were true there is no reason why everyone who is the host of these parasites (a high proportion of all adults), should not also be the subject of thyroid enlargement. Their belief is that the essential toxic factors are really the products of the bacteria associated with the amebae, and that these bacteria are the varients and the amebae the constants in many different infections in the mouth, tonsils and so forth.

Acting upon this hypothesis, they selected forty-one cases of cryptic tonsillitis with thyroid involvement for special study and treatment by emetin hydrochloride. Their conclusions touching the relations between tonsillar infection and goiter were that "inability to demonstrate endamebae in the thyroid gland renders improbable any direct causal relation of the amebic infestments of the tonsils *per se* upon the development of thyroid disturbances. However, the improvement, morphologically and symptomatically, in the treated cases leaves little doubt * * * as to an indirect relationship. A symbiosis of endamebae bacteria, leading to the elaboration and

absorption into the thyroid of selective thyrotoxic poisons, is at least conceivable in explanation of such relation."

One of the strongest supporters of the theory of infective interrelation between the tonsils and the thyroid is S. P. Beebe[9] of New York, who has from time to time put himself on record concerning it. He calls attention to numerous clinical observations on the relation of thyroid disease to previous infections. In this connection, it is well to remember that thyroid disturbances occur most frequently in persons of a thymo-lymphatic constitution, and it is these individuals who are most susceptible to infections. The terminal event in hyperthyroid patients is not infrequently an infection which has begun in the tonsil. A large percentage of patients with exophthalmic goiter have enlarged tonsils and adenoids. It is not uncommon to date the beginning of a thyroid enlargement from a particularly severe attack of tonsillar infection.

Infections in the nose and throat are undoubtedly the most common to which the human family is subjected, and the tonsil is one of the most important points of entry we have for infections, but in goiter the resultant conditions is a hyperactivity of a gland of internal secretion, and not a continued infection. It is obviously more difficult to explain such a result than to trace the connection between an acute tonsillitis and a septicemia, or an infected joint.

Infection does not in a large percentoge of cases produce such an enlargement of the thyroid gland that it would be recognized as a goiter, and it may be that the thyroid does not react in this manner except in those who are not quite normal in respect to the balance of their glands of normal secretion. If the thyroid secretion is an important element in the defense against infections, it is not impossible that it is stimulated to over-activity when occasion demands, and if the stimulus be ofted repeated it may lead to changes which we recognize as pathologic. Through the repeated stimulus to over-activity, the gland has become hypertrophied, and its heightened function continues long beyond the stimulus which originally calls it forth.

Clinically, there is an important relation between the infections in the nose and throat and hyperthyroidism. In patients between the ages of sixteen and twenty-four, from 35 to 40 per cent give a history of repeated attacks of acute tonsillitis and many have enlarged tonsils and adenoids. Rapid enlargements of the thyroid, with characteristic symptoms of over-activity, has often followed immediately after a particularly severe tonsillar infection. Such

patients bear these infections badly. Their convalescence is slow, and each attack is accompanied by severe prostrations quite out of proportion to the apparent severity of the infection. Dr. Beebe has observed that the leukocytosis in these cases is lower than that of non-goiterous patients, and that hyperthyroid patients often show a marked leukopenia with a relative lymphocytosis, indicating some influence on the blood picture operative when the organism is subjected to infection.

The tonsil infections to which exophthalmic patients are so often subject, constitute most dangerous and distressing complications, and the alert surgeon should always be on his guard against them. If there is active thyroid intoxication it is seldom wise to enucleate tonsils and adenoids, because such patients react badly to operations of any sort. The anoci-association methods so successfully employed by Crile in thyroidectomy, which Beebe described as "stealing the thyroid" ought always to be employed in all operative measures on cases of this type.

The writer has felt justified in quoting thus at length from Dr. Beebe's excellent paper, as the position he occupies is in most respects analogous to the writer's own, and the opinions brought out in the discussion which followed the presentation of the paper before the Laryngeal Section of the American Medical Association, so closely resembles those expressed by the recipients of the present writer's questionnaire. John F. Barnhill was emphatically of the opinion that the removal of diseased tonsils had no effect upon the progress of the goiter, or exerted any beneficial influence upon thyrotoxic symptoms. This was in 1914. In 1920, Dr. Barnhill made an address to this same section on *Surgery of the Thyroid*[10], in the course of which he said: "In the last six years I have made accurate notes as to the presence of diseased tonsils in all goiter cases. More than 90 per cent of all cases that I have examined have had clearly evident disease of the tonsils, and judging them from the most modern point of view as to what constitutes a diseased tonsil, I think all may rightly have been classed as having foci of infection in the tonsil. In more than 50 per cent of my cases of goiter in which operation was performed during this period, the tonsils were removed before the thyroidectomy, sometimes as long as a year previously, in the hope that the goiter operation might thus be avoided. It seems certainly true that after the thyroid is once diseased, the removal of the tonsils has little appreciable beneficial effect on the thyroid disease. Indeed, I have seen

the thyroid rapidly enlarge and the thyrotoxic symptoms increase after the performance of a most complete tonsillectomy. These observations, do not, however, form a good argument against the possibility that *the diseased tonsil may have been the original focus from which the thyroid received its infection.* Indeed, the frequent presence of infected tonsils in thyroid cases points almost certainly to a connection between the two diseases."

Approaching the question from the thyroid side, we have the assurance of Joseph C. Beck of Chicago[11], that he has frequently found the removal of one or both tonsils to be far more efficacious in preparing a patient for a thyroidectomy than ligation of the superior thyroid arteries which is "considered plausible procedure to cure a thyrotoxic disease, or arrest it so as to enable the surgeon to perform a more radical procedure, namely, thyroidectomy." He has also found "a fairly good number of thyroidectomized patients in whom the toxic condition recurred, to be much improved or completely cured by tonsillectomy." He believes that in all thyrotoxic cases it is better to proceed with a preliminary tonsillectomy, followed by the proper thyroidectomy than to reverse the procedure.

Another point of interest in connection with the thyroid and the laryngologist, is the early diagnosis of a thyrotoxic condition. The laryngologist is frequently the first to be consulted in reference to the headache and nervous phenomena, to differentiate between sinus disease, ocular conditions, and chronic focal infections particularly from tonsils.

Dr. Beck supported his contentions by reporting the following case:

Mrs. W., age 32 years, has had a somewhat small goiter for several years. As a child had many sore throats, then none for several years. Last winter had two severe attacks of tonsillitis, following which, the thyroid gland appeared to get somewhat larger. There appeared, also, all the classic symptoms of a thyrotoxic state without much exophthalmos. A competent internist counselled very strongly against major operation at this time. Under local anesthesia he removed her tonsils without any difficulty, either local or general. The thyroid gland receded in two weeks, and her general condition improved very rapidly after that. It is now three years and she has not had any recurrence of her thyrotoxic symptoms. Dr. Beck has had "a fair number of such cases with similar results."

Somewhat similar is a case recently reported by Greenberg[12] where a small goiter had been present for many years without other symptoms of hyperthyroidism. Following several attacks of "quinsy," typical thyrotoxic symptoms appeared, but were relieved by operation.

The purpose of this article, and of the investigation upon which it is based, is not so much to demonstrate a theorem, of the truth of which the writer is absolutely convinced, as it is to bring together the varying opinions and clinical observations of practitioners who have had occasion to deal with the subject from different angles, and in this way stimulate further study, research and discussion of what appears to him to be a highly interesting and significant situation. Beebe stated that his deductions were drawn from the history of approximately 3,500 patients who had thyrotoxicosis, and while it is quite possible for a practitioner to have a number of patients with thyroid disease who do not present infected tonsils or other apparent focal infection, he, nevertheless, felt that such infections are a very frequent accompaniment to thyroid disease, "constitutes an important factor in maintaining a condition which favors over-activity of the thyroid gland. One cannot see the effect of repeated infections in these patients without being impressed with their importance."

The writer would urge upon all nose and throat men the wisdom of making every routine examination include a careful scrutiny of the thyroid gland. While the consensus of opinion already cited seems to be that once thyroid disease is well established no amount of attention to tonsil conditions can bring about any improvement, we certainly have abundant evidence to show that a thyrotoxicosis in its initial stages may be retarded, or even completely aborted by the extirpation of infected tonsils.

The suggestion contained in Dr. Poynter's reply that he believed if a relation between the tonsils and thyroid is ever demonstrated, it will be through internal secretion, opens up a wide and fascinating field of investigation. The laborers in this field are more likely to be those who are approaching the question from the thyroid side, and upon them the writer would also like to urge the necessity of minutely considering the state of the tonsils of every goiter patient presented to them for the first time. Especially in those cases where a tonsillectomy has left a certain amount of tonsillar tissue in the throat, and the healed surface may still be mak-

ing infective pockets, it will be well to seek the cause of the thyroid disturbance in the tonsillar region.

It is in the hope of thus stimulating interest and—if need be—arousing criticism and opposition, which will result in a more widespread consideration of the entire subject, that the present effort to call attention to it has been made.

CONCLUSIONS.

The conclusions drawn by the author from the results of a canvass of practitioners, whom he believed to be in a position to give information regarding the possibility of a relation between goiter and tonsil infection were:

1. That comparatively little attention had been given to a consideration of this possibility.

2. That the majority believe goiter to be largely of toxic origin.

3. The tonsil is no more likely to be the focus of infection than any other location, e. g., sinuses, teeth, or gall bladder.

A survey of the scanty literature relating to this subject seems to indicate that those who have investigated the coincidence of goiter and infected tonsils, and have exhaustively considered their possible interrelation, incline to the belief that diseased tonsils may in many cases be directly responsible for goiter, both simple and exophthalmic.

It is urged upon the throat specialist that he give particular attention to the state of the thyroid gland in all cases of infected tonsils, and also upon those who are called upon to treat disordered thyroids, that they bear in mind the probability of an exciting factor in the presence of diseased tonsils.

NOTE: I have under observation at present ten cases, but have not been observing them sufficiently long in my estimation to incorporate a report of them in this paper.

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FRONTAL LOBE ABSCESS SECONDARY TO SINUSITIS.*

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Abscess of the frontal lobe most often occurs as a complication of frontal sinus disease. In empymas of long duration, the posterior sinus wall, which is often very thin, may become eroded and a fistulous communication be established with the cranial cavity. This possibility is greatly enhanced when one recalls that the internal table occasionally presents dehiscences through which, especially in chronic cases with stagnation, secretions and microorganisms may find their way into the adjacent structures. Furthermore, the cerebral wall contains numerous small foramina for the transmission of veinlets, thus affording additional routes for invasion.

In a case in which there has been established a fistulous opening the dura, at the point of solution of continuity, becomes affected. Granulations and a plastic exudate begin to form and soon there is agglutination of the dura to the underlying bone and we have a localized pachymeningitis. If the process continues the infection may penetrate the dura and involve the piamater. At this stage one of two conditions may occur. If the purulent process becomes encysted and well walled off from the remaining cranial contents it does not spread, but progresses internally and gradually the brain substance is penetrated with the ultimate formation of a brain abscess. If, on the other hand, the limitation of the infection is not complete the process extends over a considerable portion of the pial surface and results in a diffuse purulent internal pachymeningitis. Very often, however, we get a combination of both of these processes.

It is, of course, our duty as rhinologists to avoid these serious sequelae, by the early recognition of these signs and symptoms, which point to extension of a more or less benign chronic frontal suppuration to endocranial structures. But this is often times no easy matter when we consider that the symptoms of beginning

*Taken from the Nose and Throat service of the Beth Moses Hospital, Brooklyn, N. Y.

meningeal complications and those of a severe attack of uncomplicated frontal sinus disease are practically identical. Furthermore a severe frontal sinusitis may continue for days unchanged and upon operation we most unsuspectingly discover evidences of extensive disease with meningeal involvement. Then, there are those cases that come to us already well advanced, when the attempts at operative amelioration are futile. And lastly, we must not forget those cases in which, search diligently and assiduously as we will, there seem to be lacking sufficient evidence to justify more radical operative measures, and which process under our very fingers seems to slip ahead of us despite our efforts.

This is due to the fact that the frontal lobe is a silent area and definite symptoms of frontal lobe abscess are wanting. The condition may manifest those symptoms found accompanying brain abscess elsewhere, such as headache more or less localized, evidences of increased intra cerebral pressure, e. g., choked disc, slowing of the pulse and increased tension of the cerebro-spinal fluid, but on the other hand these may be indefinite and difficult to discern.

The case we a.e reporting is certainly a unique one in that it presented several features of unusual interest. The patient came to us when the condition was more or less well advanced. The signs and symptoms that directed our attention to the affected sinus were misleading in that, although upon operation we found sufficient pathology to explain the present symptomology, the real condition that untimately brought about the fatal termination was certainly an obstruse one and which, during all the period of observation gave absolutely no clue of its presence nor of its pernicious progress, until a time when the process had become established well beyond the stage where surgical intervention could be of any avail.

REPORT OF CASE.

Dora Maribella, aged 11, was admitted to the Beth Moses Hospital on June 11, 1921 with the following complaint: pain over the left eye, fever and swelling of left side of forehead and face.

Family History, Negative. Previous Personal History. The patient had always been in comparatively good health. She had the usual diseases of childhood, but never suffered from any severe illness. She was subject to frequent head colds and the mother stated that she was practically never without some form of nasal complaint.

History of Present Illness. Two weeks prior to admission to the hospital, the patient suffered from a new attack of rhinitis. The nasal discharge was profuse, and three days later she complained of rather severe headache, limited, however, to the left frontal region. This continued unabated for several days and then the condition subsided somewhat. Four days prior to admission she had a chill followed by a profuse sweat. The next day there appeared a swelling over the left eye, which gradually increased up to the third day when she was admitted to the hospital.

PHYSICAL EXAMINATION UPON ADMISSION.

General Appearance: Well nourished girl apparently very sick; conscious responding to interrogations slowly but accurately. Temperature: 103.5°, pulse 140, respiration 35. Head: Normal in size and shape. Face: Marked swelling of left half of face, involving left cheek, lower and upper lids and left forehead. Eyes: Pupils equal, react to light and accomodation. Mouth: Teeth in very poor condition, tongue coated. Neck: No rigidity, no masses, no abnormal pulsations. Chest: Breath sounds normal. Heart: Normal. Abdomen: No distension, no rigidity, liver, kidneys, and spleen not palpable. Extremities: Normal. Reflexes: Present and equal; no pathological reflexes present.

June 13, 1921. Rhinological examination reveals the presence of pus in both nares, with marked swelling and congestion of the mucous membrane. There is present marked swelling, edema and redness of the upper and lower lids and region of frontal on left side. Elicit acute tenderness over left frontal and floor of orbit. No tenderness over the antrum. The left eyeball is somewhat prominent and displaced slightly downward. The mobility of the globe is not interferred with however. Diagnosis: Suppurative frontal sinusitis with probable perforation of anterior wall of sinus. X-ray was immediately ordered; blood culture was taken, spinal tap advised.

June 14, 1921. The following data was reported: X-ray shows involvement of left antrum and ethmoid; frontals of large size with mild involvement. Spinal fluid: 20 c.c. withdrawn under slight pressure; clear, no increased cytology. Blood culture: 24 hour report negative. Blood count: 30,000 white cells, polys, 84 per cent. Urine: Slight trace of albumen, with some small hyaline casts. Treatment advised was immediate operation. Operation: June 14, 1921, 9:00 p. m.

Incision over left eyebrow and lateral aspect of nose with elevation of the soft parts and periosteum. This disclosed the presence of a cortical perforation one-fourth inch above and external to the supra-orbital foramen. The entire anterior wall and floor of sinus were soft and necrotic. These were removed and a large quantity of foul smelling pus evacuated. The entire mucosa of the frontal sinus was thickened and polypoid. This was removed and the posterior wall carefully inspected. There was no evidence of softening nor necrosis. The ethmoids were not opened and the sphenoid not drained. The entire wound was left widely open and rubber tubes inserted for drainage. Iodoform gauze was lightly packed about the tubing and a dressing applied.

A culture of the pus taken at the time of operation was subsequently reported; mixed infection with a predominance of straptococcus hemolyticus.

June 15, 1921. Patient rallied from the operation and is somewhat improved. Temperature 102°, pulse 132, respiration 34. Complains of severe pain over the wound area. Is restless. Examination of the eyegrounds shows no disc changes. There is slight fullness of the veins. There is absence of neck rigidity. Kernig and Babinsky also negative.

June 16, 1921. Wound dressed; no pus present in cavity. Iodoform gauze packing loosened; hot boric acid dressing applied. At 3 p. m. had a severe chill lasting five minutes followed by a profuse sweat. Blood culture of previous day reported still negative. Headache somewhat relieved.

June 17, 1921. Patient did not sleep well. She was restless and toward morning she became irrational. Temperature 103°, pulse 148, respiration 36; outer dressing changed. In the evening patient became quiet and then lapsed into drowsiness.

June 18, 1921. Condition of patient progressively poorer. Temperature 104°, pulse 150, respiration 38. Irrational most of time. Involuntary evacuation of feces and urine; chill followed by profuse sweat. There is present a facial paralysis of left side of face with involuntary contractions of left upper and lower extremities. Eyes are not deviated from the normal; examination of eyegrounds shows increased fullness of the veins, especially of left eye. There are no signs of papillary edema.

Upon the advent of these signs and symptoms, the first to call our attention to the presence of increased intra-cranial pressure, we suggested operation. The extraordinary feature was the develop-

ment of irratative symptoms from the cerebrum of the other side. A number of various diagnoses were made by the consulting physicians and none seemed to be able to explain the reason for the appearance of these irrative symptoms apparently originating from the other side.

The parents of the child refused operation.

June 19, 1921. There is present a complete left hemiplegia. Toward noon the patient lapsed into a comatose state and terminated the same p. m.

POST MORTEM FINDINGS.

Frontal sinus on left side clean. There are no evidences of bone involvement of posterior sinus wall. Septum of sinuses is intact. Removal of inner table on left side shows a normal dura. Incision of the dura discloses nothing pathological.

Frontal sinus on right side diseased and filled with pus. Mucosa thickened and polypoid. Inner table shows no areas of necrosis nor can there be made out any fistulous communication. Removal of inner table shows the dura thickened and presents a small area covered with granulations. Incision of the dura shows an absence of pus on the brain surface. Exploration of the frontal lobe discloses the presence of an abscess cavity about 3 mms. below the surface, in the direction of the falx. A culture from the pus subsequently showed the streptococcus hemelyticus.

The points of interest in this case are as follows:

1. The age of the patient. Complications of such severe nature are to be looked for in older individuals. This patient was only 11 years old.

2. All signs and symptoms referred us to the left frontal sinus. Nothing in the history nor in the examination directed our attention to the possibility of a severe involvement of the right sinus.

3. The absence at the time of operation of indications that the cranial cavity was involved.

4. Our suspicions were first aroused to the possibility of a bilateral affair, only when evidences of increased intracranial pressure became manifest; especially with the appearance of irritative symptoms indicating that their origin must be on the other side of the cerebrum.

5. The presence of the abscess on the side that originally gave no symptoms. It is not reasonable to suppose that one should suspect disease in the right frontal sinus when there was swelling and edema over the left frontal.

6. The failure to find any macroscopical break in the bony continuity tends to prove that the anatomical communications can well afford portals of entrance in such infections.

7. The interesting post-mortem findings.

In conclusion, we wish to bring up the question as to the advisability of exploring the other sinus in cases similar to this; where we have acute unilateral symptoms. There is no doubt, even if we had opened the right sinus by breaking through the septum of the sinuses, little would have been gained, because as was stated before we could not detect any break in the bone. However, other cases may show bone changes and so call for further exploration. As to the justification of exploring the cranial cavity, it is our opinion that in cases of a similar nature, when the establishment of drainage does not relieve the headache immediately, and when the spinal fluid gives evidences of inflamation we have a just indication for such a procedure. To wait until manifestations appear, indicating involvement of the motor area, renders the case practically hopeless. In our case it can readily be seen, had we decided to explore the left frontal lobe little would have been gained, because the abscess was located on the right side.

An important consideration in these cases is to determine the extent of our operative interference. These patients are usually very sick and anything but the establishment of adequate drainage is contra indicated. We certainly would strongly advise against any unnecessary manipulation. We saw a similar case recently in the clinic of Professor Hajek, of Vienna. This patient also terminated as a result of a frontal lobe abscess that had not been diagnosed, the abscess, however, occurred on the side of the diseased sinus.

691 Lafayette Ave.

ODOR FROM HEALING MASTOID WOUNDS SIMULATING THAT FROM NECROSING BONE ASSOCIATED WITH SECONDARY INVASION OF DIPHTHEROIDS.

DR. A. M. DUNLAP, Pekin, China.

All otologists are familiar with a characteristic odor from the discharges frequently met with in chronic purulent otitis media, which is considered to be of bone necrosis either within the middle ear or castoid cells. The writer has been led to question the correctness of this assumption, after having had three normally healing mastoids following acute mastoiditis which suddenly developed an odor indistinguishable from that of necrosing bone. Diphtheroids were isolated from all of these cases, which, in all probability, were responsible for the production of the odor.

The first case was that of a small boy who had had a double mastoid operation. The healing of both mastoids was very rapid, and early closure seemed assured. There intervened, however, what appeared to be an acute exacerbation of the inflammatory processes, which caused discharge not only from the mastoid wounds but from the middle ears as well. Almost immediately, all the discharges were noticed to be foul, the odor resembling that characteristic of necrosing bone. Considerable apprehension was experienced for fear necrosis had been proceeding in spite of the satisfactory appearance of the wounds. Bacteriological examination of the discharge demonstrated the presence of a diphtheroid in addition to the staphylococcus, which had been isolated as the predominating organism in connection with the mastoid infection. A pure culture of the diphtheroid isolated gave off the same characteristic odor as that from the discharging ears. The secondary infection ran its course within a week and recovery was uneventful.

The cultural characteristics of the diphtheroid isolated from this case were studied by Dr. Johannes Bauer of the Department of Pathology and are as follows: The organism was a gram positive, non-motile and non-spore-bearing diphtheroid rod, measuring about 0.4 by 1.0-1.5 microns and having the following cultural characters: Blood agar: Round, moist, yellowish-red colonies with dark center and light border. Bouillon: Luxuriant diffuse growth with thin, friable pellicle. Loeffler's blood serum: Small, white,

round colonies, very similar to those of streptococci. No liquefaction takes place. 18-20 hour cultures grown on this media and stained by Neisser's method show abundant, but small and imperfect, granules. Gelatine stab: Grows very slowly along the stab. No liquefaction. Potato: white, moist growth. No pigment production. Litmus milk: No change. Carbohydrates: It produces acid but no gas in dextrose and saccharose bouillon. No change in lactose, maltose, mannitol, dextrine, inuline and salicine bouillon. No indol. No H_2S.

Classified into subgroup Bac. Hoaglii (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 290).

The second case was that of a young girl who had had her left mastoid drained for the relief of a mastoiditis, from which the streptococcus haemolyticus had been isolated in pure culture two weeks after the operation. The distinctive odor was noticed without apparent change in the course of healing. There was no increases in the inflammatory process during the week that the odor persisted. Bacteriological examination of the discharge by Dr. Bauer demonstrated the presence of a gram positive, non-motile, non-spore-bearing diphtheroid rod, measuring about 0.4 by 1.0-1.5 microns and having all the cultural characteristics of the organism isolated from the first patient. The initial culture gave off the characteristic odor.

In the course of the study of the discharges of still a third patient, who was making a slow recovery from a mastoiditis, which had been infected with the streptococcus heamolyticus, Dr. Bauer isolated a diphtheroid which was probably the cause of an offensive odor which persisted more than a week. The organism as examined was a gram positive, non-motile and non-spore-bearing diphtheroid rod, measuring about 0.5 by 1.0-1.5 microns, no Neisser granules, and having the following characters: Blood agar plate: White, opaque colinies. No hemolysis. Bouillon: Uniformly turbid with yellow, thick pellicles which later sink on the bottom of the tube. Agar slants: Abundant, moist, spreading growth. Loeffller's blood serum: Small, white, round colonies. No liquefaction. Litmus milk: Coagulated within two days. Potato: Moist, thick growth with yellow pigment production. Carbohydrates: Produces acid but no gas in dextrose, lactose, saccharose and maltose bouillon. No change in mannitol, dextrine, inuline and salicine bouillon. No indol. No H_2S.

Classified into subgroup Bac. enzymicus. (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 290).

Conclusions: The writer is of the opinion that the secondary invasion of diphtheroids in the first two cases, and, in all probability, the third, was responsible for the sudden appearance of a foul odor from these normally healing mastoids. The fact that Mellon makes no reference to a characteristic odor from any of his hundred strains, would lead one to conclude that either it is not a frequent occurrence or that cultures quickly lose this peculiarity on being sub-cultured. Dr. Bauer was unable to secure a continuation of the odor from any of the sub-cultures of the strains described above, which were submitted to him for examination. The instability of the members of this group might easily account for this failure.

In speaking of the general pathology of diphtheroid infections, Mellon states (*Journal of Bacteriology*, Vol. 2, 1917, page 476): "That the virulence of this group of organisms is usually not high, is suggested by the fact that some member of it has been isolated repeatedly from almost all organs of the body, whether normal or in a state of disease. When one says that most diphtheroid infections are of the nature of sub-infections, little more comment need be made. However, there sometimes arise acute inflammatory processes which may at times be a serious menace to life." The work of Dr. Hamilton (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 481), and others suggests that this group may be considerably more pathogenic than we have been accustomed to rate it. The first case reported here was the only one to give any clinical evidence of pathogenicity.

The invasion of normally healing mastoid wounds with odor-producing diphtheroids suggests the possibility of similar occurrences in cases of chronic purulent otitis media. If a bacteriological study of such cases demonstrates that diphtheroids are responsible to any considerable extent for the foul odor so frequently encountered, then we shall need to make a more careful examination before concluding that necrosis of the bone is taking place either within the middle ear or mastoid antrum. A sclerotic mastoid presenting a middle ear partially destroyed with a moderate otorrhea which is offensive, may well be a persistent discharge from the eustachian tube with a diphtheroid acting as a secondary invader. A study is now being carried on ti determine whether the diphtheroid does or does not play an important role in these cases.

CASE OF SINUS PHLEBITIS WITH NORMAL MIDDLE-EAR AT TIME OF OPERATION.*

Dr. Isidore Friesner, New York.

The patient, a school boy 6½ years of age, was admitted to Mt. Sinai Hospital on May 25 with a history of discharging ears and fever of three weeks' duration, and chills of two days' duration. The child's antecedents and past history had no bearing on the present illness.

Three weeks ago he became sick with a bilateral otitis media, and both ears were incised. Since then both ears have been discharging moderately and the child has been running a low but continuous fever. Within a few days prior to admission, however, the temperature became septic in type and the child had two distinct chills and sweats. A blood culture done outside the hospital was reported sterile. On admission to the hospital, the child appeared acutely ill, but on physical examination the only positive findings were in the ears. The right ear showed a mucoid discharge, moderate in amount, coming from a perforation in the posterior inferior quadrant. In the left ear the discharge was more abundant, and here also was a perforation in the posterior inferior quadrant. no mastoid tenderness was elicited on either side. The nose, throat, and sinuses were negative. The urine had a specific gravity of 1,015, was acid in reaction, and showed only a faint trace of albumen. Culture from the urine was negative. The blood picture showed a hemaglobin of 82 per cent, with a red blood count of 4,920,000; white cells, 39,400, with a polymorphonuclear count of 91 per cent and a lymphocyte count of 9 per cent. The von Pirquet test was negative. A general sepsis with some unknown focus—possibly in the ears—was suspected; but blood cultures performed on June 26, 27, and 31 were all negative. On the twenty-ninth the child began to complain of frontal headache, and a lumbar puncture was performed. The fluid was found to be clear under a moderate amount of pressure, and contained no cells. The fundi were normal. X-ray examination of the sinuses, chest, femora, and mastoids was absolutely negative.

*Read at the Section on Otology, New York Academy of Medicine, Nov. 11, 1921.

The child continued to run a septic temperature and in the firm conviction that it had a general sepsis, blood cultures were persisted in; six in all were made. During this time the discharge ceased from both ears; the drums healed; the landmarks (including light reflexes) became manifest, and hearing was normal.

On June 2, firm tender glands, palpable on the left side of the neck at the angle of the jaw, were discovered. On June 5 a blood culture was reported positive, with streptococcus hemolyticus in the flasks only. Operation was decided upon. In the meantime, the blood count had dropped to 15,000 white cells, of which only 75 per cent were polymorphonuclears.

Operation was performed on the left mastoid on June 5. The periosteum was found to strip from the mastoid as if the mastoid were normal. The cortex was found to be sclerosed; the antrum was empty, and the sinus plate was normal. A culture from the antrum showed streptococcus hemolyticus.

In cleaning the sinus plate, the sinus was exposed and looked yellow. It was then uncovered from behind the knee to the horizontal limb, and was found to be filled with fluid pus. When the plug was removed from the torcular end of the sinus, pus exuded. The dissection was continued back to the torcular, and the torcular end was curetted without encountering free bleeding. The horizontal limb also was curetted, and no bleeding occurred. The bulb was not explored because of the child's condition. The jugular vein was ligated in the neck at about the level of the omohyoid. The child continued to run a septic temperature until four weeks after operation. Blood cultures taken on June 8, 10, 12, 13, 23, and 27 all showed a growth of streptococcus hemolyticus. On June 8, 10, 12, and 17 the child was given transfusion of about 200 cc. Toward the latter part of June the temperature, which had risen as high as 105.6° and had been septic in type, began slowly to drop. The blood count in June 28 showed only 9,400 leucocytes, of which only 74 per cent were polymorphonuclears. On July 6 the blood culture became sterile, and the temperature remained flat from that time until the patient's discharge on July 18.

36 East 73rd St.

CASE OF BRAIN ABSCESS IN A SYPHILITIC.*

Dr. Truman L. Saunders, New York.

Eugene F., age about 25, was admitted to my service at the New York Eye and Ear Infirmary, Sept. 7, 1921, complaining of headache, high fever and an unhealed mastoid wound. Upon inquiry it was learned that he had been operated upon June 23 for a bad mastoid of the left side of about one week's duration. The wound did not do well, the discharge persisting from the canal and the posterior wound; on July 15, 1921 his blood Wassermann was found to be 4 plus. He was discharged the following day and referred to the genito-urinary department of one of our well known dispensaries for anti-luetic treatment.

Upon readmission to the hospital, Sept. 7, 1921, his physical condition was briefly as follows: The mastoid wound had a dirty appearance and there was a profuse discharge both from the auditory canal and the posterior wound. His temperature was 103.4,° his pulse 96, respiration 20. He complained of a severe headache throughout his whole head, possibly more marked on the left side. He was not clear mentally and was somewhat irrational, he could not name certain objects when shown to him. To members of the house staff he seemed to be typically aphasic but when seen by the author twenty-four hours later the picture was obscured by his confused mental condition. No other focal symptoms, blood count, R.B.C. 4,500,000, W.B.C. 13,000, polynuclears 73 per cent, blood Wassermann still 4 plus, spinal Wasserman negative. Examination of spinal fluid showed Fehlings plus, globulin plus and 894 cells per cubic millimeter. A staphylococcus was found upon cluture, but this was believed to be a contamination. Fundi negative. Temporo-sphenoidal abscess and cerebral lues were the two possible diagnoses to be considered, and although we were uncertain how much his leutic infection had to do with his general condition, an exploratory operation was decided upon. This was performed Sept. 10, 1921 when the old mastoid wound was reopened. The bone was markedly congested and bled profusely, a large sequestrum consisting of almost the entire posterior wall was removed. A radical mastoid operation was performed and the tegmen antri et tympani was removed, exposing a large area of dura over the base of the temporo sphenoidal lobe. This appeared normal and showed

*Read at the Section on Otology, New York Academy of Medicine, Nov. 11, 1921.

no gross signs of intra-cranial tension, *i.e.*, it did not bulge and there was normal pulsation. As we had found enough to account for the temperature and the headache, and as the operation disclosed no gross signs of an abscess, because of the questionable character of his aphasia and his luetic condition, it was decided to stop the operation at this point and return the patient to the ward for observation and anti-luetic treatment. This was given in the shape of neo-salversan in full doses intra-venously, intra-muscular injections of salicylate of mercury and potassium iodide by mouth. Under this regieme the patient at first improved, his temperature dropped, his headache became much less and his mental condition more clear. On Sept. 20 the cells in his spinal fluid had dropped to 60 per cubic millimeter. Notwithstanding his anti-luetic treatment, his headaches did not entirely cease. Before his third operation his general condition became gradually worse and the conclusion was forced upon us that he had an intracranial condition, Dr. Dench saw the case with me at this time and agreed that an exploratory operation for temporo-sphenoidal abscess was advisable. On October 1, 1921, was again placed upon the operating table and under a general anesthetic a portion of the squama, adjacent to our previous dural exposure, was removed. The dura at this time presented a marked contrast to its appearance on September 10, 1921. It was covered with granulations and was bulging. Pulsation was almost absent. The site of the greatest bulging was on the outer surface of the temporo-sphenoidal lobe at the posterior part of the bony opening. Here, after incision of the dura, the brain was explored drectly inward with a groved director to the depth of one and one-half inches, with negative results. Another exploration was attempted in front of this but a large vein was encountered which caused us to abandon the attempt at this site. However, when the director was passed from the original site of the tegmen tympani upward and slightly forward into the under surface of the temporal lobe, pus was encountered at the depth of about one inch. With the grove director in place, the incision in the dura was enlarged and an artery clamp was gently passed along the line of the director and spread evacuating an abscess cavity of about half an ounce capacity. The pus had no odor and there was apparently no abscess wall. After the pus had ceased to flow, a small rubber cigarette drain was inserted into the cavity and the wound packed with iodoform gauze.

The subsequent history was one of gradual improvement. The headache disappeared soon after the operation. On the fifteenth

day the patient complained of a severe headache lasting for two days, probably due to the damming back of the discharge. The drain was gradually shortened, changed daily and finally omitted about three weeks after the operation. He is now in good spirits, walking around the ward and gradually regaining his strength.

The day following the operation, his mental confusion had disappeared and his aphasia was found to be typical. This has gradually passed away and his memory has returned. His radical mastoid cavity is clean and gradually healing. I am inclined to attribute whatever success we have had in this case to the following factors: first, that the abscess was evacuated without undue trauma to the cerebral tissue, secondly, that the patient was kept in bed for over three weeks after the operation.

120 East 61st street.

CASE OF TEMPORO-SPHENOIDAL ABSCESS COMPLICATING CHRONIC PURULENT OTITIS WITH SPONTANEOUS RUPTURE AND HERNIA INTO THE MASTOID. AUTRUM.*

DR. D. S. DOUGHERTY, New York.

Patient, female, Bohemian, age 35, was admitted to the neurological service of the hospital with a diagnosis of epilepsy and kept under observation for several days, there being considerable doubt as to the accuracy of the diagnosis.

Past history was difficult to ascertain owing to her mental condition and the fact that she spoke only a dialect not readily understood by the interpreter.

Physical examination was negative except the existence of a discharge from the left ear.

On May 6, patient was transferred to the otological service. At the time of transfer, patient complained of severe frontal headache, radiating over the left side of head, especially severe in the morning, often absent at night; had occasional spells of vertigo and was at times slightly irrational. Inspection showed a left purulent otitis media, the canal being filled with polyps and granulations.

*Read at the Section on Otology, New York Academy of Medicine, Nov. 11, 1921.

There was no mastoid tenderness, no nystagmus, no neuro-retinitus. Patient was not nauseated; reflex tests were negative and the temperature and pulse were normal.

Spinal puncture was done, the fluid coming away under pressure, 9683 cells to the c.mm. Culture of fluid, negative; blood culture negative. Culture from discharge, staphylococcus. Blood count: leucocytes 12,000; polynuclears 83 per cent.

A tentative diagnosis of cerebral abscess complicating chronic otitis and mastoiditis having been made, it was decided to do a radical mastoid operation and to explore the temporo-sphenoidal lobe. This accordingly was done May 8 under ether anesthesia, with the assistance of Dr. Hays and the house staff.

On exposing the mastoid antrum, it was found to be filled with a soft greyish red mass, which proved to be brain substance, covered with blood, protruding from a ragged opening in the dura. There was complete dehicence of the tegmen antri and a general breaking down of the mastoid cells.

The cerebral matter forming the hernia, together with a small portion inside the dural opening, was removed with a sharp curette and exploratory probings made without any resultant pus. A strip of iodoform gauze dipped in alcohol was packed firmly against the exposed dura, the distal end of the strip being used as a drain; this drain, however, being inserted very superficially. The radical mastoid operation was completed and the wound left open, iodoform gauze being used as a packing. During the operation the hemorrhage was extensive.

The patient suffered no untoward symptoms, the temperature not rising above 100° and becoming normal after the second day. Relief from the headache was experienced in the first twenty-four hours.

The wound was not dressed until the sixth day, when the packing was removed and renewed; no return of the hernia was observed. On the fourteenth day, May 22, the patient was again anesthetized and a modified Panse flap made, the upper flap being made considerably larger than the lower. No attempt was made to use a mere skin flap, it being deemed wiser to leave it as heavy as possible, but enough cartilage was removed to break its resiliency. The wound was sutured and the canal packed with plain gauze.

The future history of the case was uneventful; she remained several months in the hospital undergoing gynecological treatment, and at no time did she complain of any recurrence of cerebral symptoms.

ETHMOIDITIS AND SPHENOIDITIS IN RELATION TO EYE DISTURBANCE; REPORT OF THREE CASES.

DR. MARGARET A. WARLOW, Philadelphia, Pa.

Through the studies of Hajek, Loeb, Skillern, Sluder, Schaeffer and others, progress has been made in our knowledge of the relationship between certain ocular conditions and diseases of the nasal passages, and their accessory sinuses. In some cases pus is present in the sinuses, and in others, there is hyperplasia of the mucous membrane. Inasmuch as in discussion of this subject, we hear protests against too much intranasal surgery for relief of visual disturbance, it would seem that case reports would be of value.

In his book, "Headache of Nasal Origin,"[1] Sluder reports cases where nasal operations were necessary, but at no time was there pus present in the nose, nor did the trans-illumination or X-ray examination show clouding of the sinuses. These were cases of hyperplastic sphenoiditis and ethmoiditis.

Hyperplasia[2] has been defined by Vail as a rarefying osteitis associated with inflammatory swelling and fibrous thickening of the mucous membrane lining the accessory sinuses.

It is brought about according to Delafield and Prudden by long continued hyperemia.

The symptoms[3] are caused by the inflammatory process extending through or transmitting its toxins through the thin bony walls to the adjacent nerve trunks. (Dr. Sluder proved that cocain readily passes from the sphenoid sinus to the nerve trunks.) Probably the most serious factor is the bone change in the hyperplastic process, with or without periostitis.

Dr. Jonathan Wright believes that some of the pain in these cases must be due to a periostitis in the nasal fossa, just as such a lesion on the shaft of the tibia causes pain. Hyperplastic disease of the nose and sinuses involves not only the bone but the soft parts covering them.

Although the hyperplasia may involve only a small portion of the mucous membrane lining the sinuses, it will be readily understood that even a very small involvement may be disastrous according to its position; for example, if localized about the optic canal, it may cause impairment of vision without other symptoms; if localized in

the lower aspect of the sinus, it may cause a maxillary neuralgia, or, if on the floor, it may give rise to Vidian neuralgia of any grade. The term Vidian neuralgia expresses pain in the ear, mastoid, occiput, neck, shoulder-blade, shoulder, arm, forearm and hand.

In the cases of hyperplastic ethmoiditis and sphenoiditis, the process is rarely unilateral. Symptoms, however, are generally more marked on one side than on the other, due to a deflected septum usually in the ethmoidal region. The middle turbinal on the opposite side is hypertrophied and fills the concavity formed by the deflected septum. There is some increase in redness, with more or less thickening of the mucous membrane.

Hyperplastic changes in the sphenoidal region are of great importance on account of the intimate relation of the many nerve trunks in the region of the body of the sphenoid.

In a recent article, Dr. Harvey Cushing says: "There can be no doubt but that suppurative or hyperplastic inflammation of the ethmoidal or of the sphenoidal cells may in certain cases lead to inflammatory changes of adjacent nerves." Inflammatory processes may affect the optic nerve in sucn a way as to produce reddening and infection of the eyes.

A scant, serous secretion usually accompanies a hyperplasia of the ethmoid and sphenoid sinuses,, although in some cases no secretion of any kind is present. In the suppurative cases, of course, pus is present and diagnosis easy, but in the hyperplastic cases, the macroscopic changes are often so slight that diagnosis is difficult.

We operate in both types of cases to secure ventilation and drainage, ventilation of the sinuses being quite as important as drainage.

The following case is one of hyperplastic ethmoiditis and sphenoiditis causing serious eye involvement without any secretion in the nares:

Case I. Mrs. G., age 43, came to the eye clinic of Dr. Mary Buchanan at the Woman's Medical College Hospital, March 15, 1921, complaining of frontal and occiputal headache with failing vision, which was rapidly becoming worse. Dr. Buchanan's examination disclosed the following: The patient has never worn glasses; externally, the eyes look normal, full movements in all directions; vision O. D. 5/30 and O. S. 5/5, media clear. The right field was cut down to fixation, O. S. for form and color was cut down to within ten degrees. The right disc was pale, edges blurred, showing there had been a marked inflammation of the optic nerve, which was becom-

ing atrophic. The left optic nerve had an unhealthy appearance, although it could be outlined distinctly. Fields No. 1.

Dr. Buchanan thought the eye condition was due to some sinus trouble, and referred the patient to the Nose and Throat Clinic, insisting that blindness would result unless the pressure on the optic nerve was relieved at once.

We obtained the following history: The patient had always been healthy until the menopause three years ago, when she first noticed frontal headache present in the morning, gradually disappearing after she had been up for a few hours. A few months later pain appeared in the occipital region. There was no pus or discharge from the nose, but the patient said she had a feeling of tightness and discomfort over the bridge of the nose and in the eyes. Later, the patient had trouble with her eyes. She described it as "shadows" interfering with her sight. The trouble first appeared in her right eye, later in the left in lesser degree. The Wasserman test was negative. An X-ray was taken of the orbits and sinuses showing cloudiness of the sphenoids and ethmoids.

Nose and Throat examination: Teeth in good condition. Faucial tonsils small and embedded. The septum deviated to the right, especially in the ethmoidal region; there was considerable pressure between the septum and the right middle turbinal; the left middle turbinal was hypertrophied, filling the concavity formed by the deviated septum. We could not see the sphenoidal region because of the obstruction in the upper portion of the nose. No pus was present in the nares.

Realizing the serious condition of her eyes, we decided to operate the following day, and we thought it advisable to have the patient sign a paper releasing us from any blame if the sight was not improved by the operation, or in the event of her becoming blind. Dr. Buchanan feared the right optic nerve was so affected that the operation might not help that eye, but expected to save the sight of her left eye. The patient was suffering intensely with frontal and occipital headache, and was mentally depressed on account of her failing vision.

March 15, 1921, we did a submucous resection, removed both middle turbinals, exenterated the ethmoidal cells on both sides, and opened both sphenoid sinuses.

A local anesthetic was used, consisting of equal parts of 4 per cent cocain and adrenalin solution. The patient stood the operation very well.

The following day there was considerable swelling around the right eye, due to emphysema. The patient did not complain of much pain, and was fairly comfortable. Twenty-four hours after the operation, she said she could see better with the left eye and objects did not seem blurred, as they did previous to the operation.

One week after the operation, the right field had increased to almost twenty degrees in the upper half and to ten degrees in the lower. The left had increased to twenty degrees in all directions. Vision had increased, O. D. 5/15, and O. S. 5/5.

The swelling of the right eye decreased; her headaches, occipital pain and distress in her eyes gradually disappeared. Fields No. 2.

When I examined her May 15, 1921, she was free from pain, nares clear, and her vision was gradually improving. Fields No. 3.

In the next case which I will report, pus was present in the left frontal sinus and ethmoidal cells, causing serious trouble with his only good eye, the left had always been poor.

Case 2. Mr. B., age 31, a student at Temple College, was referred by Dr. Mary B. Thornton to Dr. Mary Buchanan on account of trouble with his eyes. After examining the patient, Dr. Buchanan referred him to me, diagnosing the condition as a deep keratitis in the right eye, probably due to some sinus trouble. The patient's vision became blurred, he was in great distress, as it interfered with his studies. He wore dark glasses; his eyes showed congestion and lacrimation, and he said his vision had been failing for several weeks. R. E. 5/9, L. E. 1½/60; vision became rapidly worse. He had pain in the frontal region on both sides, much worse on the left, but no pain in his eyes. He had not worried about the frontal pain, but he feared he was going blind.

On examining the nares, I found the septum deflected to the left in the ethmoidal region, pus was present in the middle meatus. There was considerable pressure between the septum and the middle turbinal, interfering with the normal drainage of the frontal sinus and ethmoidal cells. Right naris was free, no pus present. Dr. Buchanan reported that the eyes were in such a serious condition that an immediate intranasal operation was necessary. I, therefore operated the following day, straightened the septum, removed the anterior end of the left middle turbinal and opened the anterior ethmoidal cells.

A great deal of pus discharged for several days following the operation. The patient received atropin sulphate gr., 1/200 every four hours, until the pus gradually diminished and finally disap-

peared. Three days after the operation the patient was again examined by Dr. Buchanan, who reported that the eye condition was decidedly better and the patient continued to improve rapidly.

April 18, 1921, I again saw the patient. He is finishing his course at Temple College and has no trouble with his eyes if he uses them with ordinary care. The pain over the frontal region has entirely disappeared and the nares are free from pus.

I asked him how soon after the operation he noticed improvement. He replied: "It may be imagination, but I thought my eyes felt better the day following." He is entirely relieved of his frontal headache and his vision is good.

The third case which I will report is one of exophthalmos, caused by empyema of the ethmoidal and sphenoidal sinuses, both sides being involved. According to the American Encyclopedia of Ophthalmology, exophthalmos is a symptom of some underlying condition, local or general.

Among the etiological factors, we have extension from affections of the paranasal sinuses. Although this is the first case I have seen, in searching the literature, I find there are a number of cases on record in which exophthalmos was caused by some pathological nose, throat or ear condition.

Hack[6] has reported a case in which a girl of seventeen years had exophthalmos since childhood. Examination revealed a marked hyperplasia of the erectile tissue of the inferior turbinals. They were cauterized, and the following day the exophthalmos had disappeared; also the nervous cardiac palpitation, and the size of the thyroid diminished, and a slight myopia, which had been present before the nasal operation, disappeared.

The exophthalmos had preceded all the other signs of Graves' disease for some years, and Hack thought the excitation of certain portions of the peripheral sympathetic of the swollen tissue of the nose had occasioned the other symptoms, all being, according to him, of the nature of a reflex neurosis.

He attributed the exophthalmos to hyperemia of the orbital vessels caused by reflex dilation of their walls, and to marked turgescence of the retrobulbar fat, which he said Michel had already referred to as cavernous tissue.

Cases are reported[7] in which exophthalmos was due to disease of the post-ethmoidal cells, one which was due to right suppurative otitis media, another in which a case of exophthalmos and third

nerve palsy, followed the exenteration of the right ethmoid labyrinth which was full of pus.

Other cases are reported in which the exophthalmos had originated from inflammation of the orbital tissue, transmitted from inflammation in the nose caused by maxillary sinusitis. Also, two cases in which the removal of the anterior end of the middle turbinal, allowing drainage of the inflamed frontal sinus, cured an existing exophthalmos.

Dr. Hurd in THE LARYNGOSCOPE, May, 1920, reported a case of enlargement of the sella tucica, in which exophthalmos was present.

The following is a case which I reported at the Philadelphia Laryngological Society, March, 1921.

Mrs. H., age 48 years, was referred to the College Hospital by Dr. Weeks-Metzer of Riverside, N. J., June 18, 1920. The history disclosed that the patient had been well until December, 1918, when she suffered for several weeks with rheumatism. She recovered, and continued well for several months. On April 15, 1919, she awoke with severe pain in her head and eyes, worse over the left eye. The morning following, the left eye was bulging to such an extent that the upper lid could not be seen. She was unable to wear her glasses on account of the marked exophthalmos, and she said she was blind in the left eye.

The following day, the patient went to an eye specialist, who sent her to a hospital where she was examined in the eye clinic and vised to have her left eye enucleated. She did not accept the advice given and was without treatment for several months.

Four weeks following the attack on the left eye, May, 1919, the right eye began to pain and bulge, but never so much as the left. When she felt something dropping in the back of her throat, the eyes were less painful.

On admission to the Woman's College Hospital, fourteen weeks after the original attack, there was marked exaphthalmos of both eyes, the left worse than the right. Vision in both eyes poor, the left being much worse than the right. She was unable to close her eyes, suffering intensely with pain in them, and with frontal and occipital headache.

She was admitted to the Medical Department and examined by Dr. Frances C. Van Gasken who found the following condition present: The thyroid gland was not enlarged. Temperature varied from 98°-100.° Pulse 74-90. Blood pressure, systolic 112, diastolic 84. The Wasserman was negative.

She was referred to the Nose and Throat Department, where she was examined by Dr. Margaret Butler who made the following report: Nasal chambers free in the respiratory portion. Septum deflected to the left causing firm pressure in the ethmoidal region. Right middle turbinal presses on the septum. Mucous membrane normal in appearance.

Full upper denture. The few teeth present are in bad condition. Fauces free. Abundant purulent secretion in the naso-pharynx. Posterior ends of turbinals enlarged. Exploration of sphenoid and pituitary regions advised.

Transillumination showed the frontal and maxillary sinuses clear; X-ray examination showed the ethmoid and sphenoid sinuses cloudy.

She was referred to the Dental Department where she had immediate treatment.

Eyes examined by Dr. Mary Buchanan. Exophthalmos of both eyes, the left being much more prominent than the right.

Two opacities on the right cornea from ulcers about three months previous. Injection of palpebral and bulbar conjunctivae. Media clear. Discs well defined. No gross lesions in fundus. Fields cut on temporal side, left being cut to 30 degrees and right from 40-60 degrees. Both fields also cut a little to nasal side. Fields No. 4.

The patient was suffering intensely and she was referred back to me and we decided to operate.

On examination, I found the condition to be the same as that reported by Dr. Butler, July 1, 1920. I did a submucous resection, removed the left middle turbinal, exenterated the ethmoid cells and opened the spenoid on the same side. Pus drained froom the ethmoidal cells and the sphenoid.

The patient had suffered so much and was so anxious for relief that she endured the operation very well, but I thought it advisable not to open the right sphenoid and ethmoid cells at this time.

The following day, the patient was sure she was much better, the exophthalmos was less in both eyes, especially in the left. Patient had much less pain than previous to the operation. It was not necessary to give morphin, but we gave atropin sulphate gr., 1/200 every four hours, unless the mucous membranes were too dry, then we lengthened the interval between doses. The atropin helped to dry the secretion, also to lessen the swelling of the mucous membranes.

Four weeks later, I removed the right middle turbinal, exenterated the ethmoidal cells and opened the sphenoid on that side.

Pus was present here also, although not so abundant as on the left side.

After the second operation, there was continued improvement in the exophthalmos. She was able to close both eyes, and the vision continued to improve. Later, we used suction which was helpful.

When I last examined the patient, May 5, 1921, I found only slight exophthalmos. She could wear her glasses without discomfort. No pus in either nares, and she was cured of the intense pain she suffered before her operations. Fields were normal.

CONCLUSIONS.

All three cases above reported had serious eye conditions, due to sinus trouble, and the relief following the opening of the sinuses was remarkable. In the first case, one of hyperplasia involving both sides, an intranasal operation entirely cured her frontal and occipital headache, and greatly improved her vision.

The second case was one of unilateral, suppurative, frontal and ethmoidal sinusitis. The case was cured by intranasal operation, which allowed drainage of the pus present in the diseased sinuses.

The third case was one of double suppurative ethmoidal and sphenoidal sinusitis, causing extensive exophthalmos. This case was relieved of the intense pain which she had suffered previous to her operations, her vision improved, her fields from being very much cut are normal, and her exophthalmos is decidedly less.

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1831 Chestnut St.

A NEW INSTRUMENT FOR RESECTING THE INTERNAL WALL OF MAXILLARY SINUS.

Dr. Wesley Bishop, Minneapolis.

The accompanying illustration depicts an instrument which I have been using for some time in resecting the internal wall of the maxillary sinus.

Modifying the Cavanaugh nasal shave by furnishing it with a pointed extremity and curving it so that it can be introduced in the proper direction, an instrument is provided which properly used excises the bone and mucous membrane cleanly with a minimum of trauma to the adjacent tissues.

I believe that the main reason that the opening made in the antral wall closes so frequently is because in performing the resection the mucous membrane lining the antral wall is not cut out neatly with the bone but rather is pushed before the entering instrument, separated from the bone and left behind as a jagged curtain more or less occluding the bony opening.

The mucous membrane quickly granulates and fills in the bony opening.

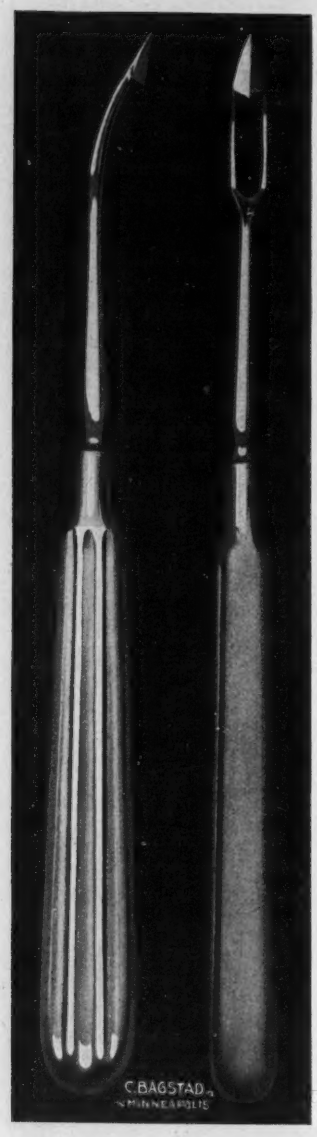
The instrument by reason of the reverse action of its chisel point cuts the mucous membrane cleanly before it engages the bone, obviating the possibility of leaving the mucous membrane behind.

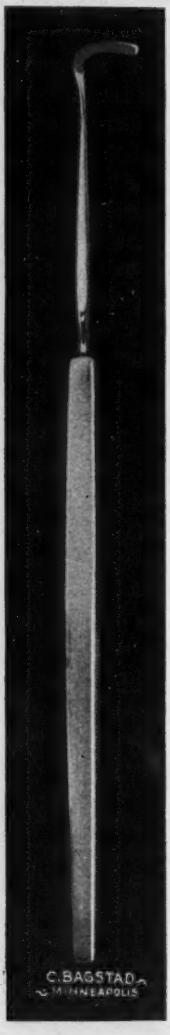
In operating, the inferior turbinate is if necessary bent upwards and the instrument thrust through the antral wall at the usual point of election, then by pulling forwards the reverse chisel engages the wall and makes a clean cut opening the width of the fenestrum.

The use of a rasp for making an opening in the antral wall is very popular, it is a simple and efficient instrument but there is one objection to its use which must be considered, namely, the rasp breaks off rather than cuts the bone and the possibility of small pieces of bone falling into the cavity of the antrum is very real and these should they remain in the sinus (which they may do in spite of repeated irrigations) may become a cause of prolonging suppuration.

That the presence of a piece of bone acting as a foreign body may do this is well illustrated by the following case:

Mr. H. Aet, 56. Injured by flying stick of wood during a cyclone received a wound of the right cheek, the wood penetrating the maxillary sinus. The attending surgeon extracted the wood and sewed up the cheek wound.


C.BAGSTAD
MINNEAPOLIS


C.BAGSTAD
MINNEAPOLIS

Following primary union of the wound there was considerable swelling and tenderness over the region of the sinus, this gradually subsided but in about a month a foul purulent discharge was manifest in the right nostril.

A local specialist diagnosed an acute antritis and by means of a canula introduced through the antral wall under the Inferior Turbinate irrigated the sinus cavity. Suppuration continued in spite of frequent irrigations and five months after the initial injury the patient consulted me.

There was a profuse stinking discharge from the right antrum. A Mickuliz-Krause was performed providing a large opening into the antrum and through this in addition to frequent cleansing irrigations, solutions of Argyrol and Silver Nitrate were each tried out over a period of two months.

As the suppuration persisted a Caldwell-Luc operation was performed, on retracting the cheek and exposing the surface of the bone in the Canine fossa the evidences of the old injury were apparent, there had been a tri-radiate fracture and at the point where the three lines of fracture met a portion of the bone, triangular in shape and about one-half inch from point to point of each side of the triangle was missing.

The opening was enlarged sufficiently for inspection and exploration, the mucous membrane in spite of the prolonged suppuration was smooth and pinkly normal to the eye. The angle formed by the floor of the antrum and the alveolar process was very deep and narrow and down in this gutter was found a piece of black necrotic bone almost circular in form and approximately one-quarter inch in diameter and one millimeter in thickness.

Recovery was uneventful, all discharge having ceased by the end of the second week following the operation.

Judging from the size of the hole in the anterior maxillary wall and the size of the piece of bone found in the sinus it had taken seven months to reduce the fragment to one-half its original dimensions.

Is it not possible that some of our failures to cure may have been due to retained fragments of bone broken off during resection of the sinus wall, acting as foreign bodies and prolonging suppuration altho the primary infection for which we had operated may have been removed.

616 LaSalle Bldg.

A REPORT OF TWO CASES OF SYPHILIS OF THE EIGHTH NERVE AND INNER EAR.

DR. ELBYRNE G. GILL, Roanoke, Virginia.

Case 1: Patient J. B., age 29 years, came in to see me February 21, 1921, and gave the following history: "The sixth of ten children born to my parents. Two sisters died in infancy. One brother, 21 years old, died of heart trouble. One brother, age 29, died of influenza. My father died of heart trouble at 69 years of age. My mother, sister and remaining brothers living and well. Started to school when six years old and in about two years my eyes began giving me trouble. My father brought me to Roanoke to an eye specialist. He said my trouble was iritis. He fitted my eyes with glasses and they seemed to get all right. My next trouble was in 1911 when I was 18 years old. My left eye became inflammed and after a couple of months, during which time I did not see a doctor the sight became affected. Finally in the fall of 1911 I went to another specialist. He treated me for some time, two or three months, during which time my sight became very bad in both eyes. About January, 1912, he told me I had syphilis and knowing that I had not acquired it and not knowing that I could inherit it I became insulted and left this specialist. At that time my sight was about gone and I could not walk across a street without being led. On February 15, 1912, my brother took me to Richmond and placed me under the care of an eye specialist. He treated my eyes and gave me medicine but did not say that I had syphilis. In about three weeks my sight began to get better and during the summer of 1912 I made several trips alone to Richmond for treatment. He concluded his treatments in the fall of 1912. My sight is now about as when he finished with me. I can see very well with my left eye, but cannot see this writing with my right eye. Then in 1913 my hearing began to get bad so I went to another specialist. He treated me without any results. He finally convinced me that I had syphilis, so in that year I began taking 606 treatments. I cannot say how many 606 treatments I have had since then but it is about twenty-five. I know of more than twenty but don't think it was as many as thirty. Those treatments were from several different doctors. Finally in two or three years my hearing had gotten very bad, I was persuaded to go back to the specialist at whom I had got insulted. He treated me once or twice each

week by blowing air into my ears, but my hearing continued to get worse. For three or four years I have not heard any one talking. In February, 1918, I went to Hot Springs, Ark., where I took a full course of the baths, and also had my back rubbed with mercury daily but my hearing did not improve. I continued the 606 treatments until in January, 1920, I got my first and only negative report on my blood test. Since then I have not had any more test nor any more 606. I do not know how my blood would show today as I have never gotten nerve to have another test. About four years ago I began to have a lot of trouble in my walking. Several doctors diagnosed it as locomotor ataxia. Dr. J. treated me for it for sometime and while it is not yet eradicated, yet I walk lots better than I did." (These are the patients exact words.)

The results of my examination is as follows: Nose: Septum is deviated to the right side. Throat: Tonsils enlarged and diseased. Ears: Right ear drum membrane slightly retracted; otherwise normal, left ear drum normal. Eustachian tubes patent. Sinuses: All clear to transillumination. Functional Examination of Hearing: All test negative, absolute deafness. Turning Test and Caloric Test-Cold: Nystagmus none, Vertigo none, past pointing none, falling none.

This picture of a dead auditory apparatus and a failure of any of the semicircular canals to produce responses, shows beyond all doubt that the labyrinth or eighth nerve is destroyed.

Case No. 2. Patient G. G., age 26, came in to see me February 5, 1921, and gave the following history: "For past six or seven years has been deaf in right ear. Deafness came on gradually—was treated by catheter inflation for one month by a specialist. Last night he became suddenly deaf in his left ear. No history of deafness in family except a second cousin who is entirely deaf.

The result of my examination are as follows: Ears: Both ear drums all right. Tonsils: Diseased. Nose: Septum slightly deflected to left side. Sinuses: All clear to transillumination. Functional Examination of Hearing: All test negative, absolute deafness. Labyrinth Test: Dizziness—None; Staggering—None; Falling—None; Romberg—None; Tinnitus—Yes. Spontaneous Nystagmus: Looking to right—No; Spontaneous Nystagmus: Looking to left—No: Pointing: Shoulder from above—No. Pointing: shoulder from below—No; Pointing: Shoulder from side —No. Turning Test and Cold Caloric: Nystagmus to right—No; Nystagmus to left—No; pointing right shoulder from above—No; Pointing left shoulder from above—No. Eye Exami-

nation: Vision twenty thirtieths O. U., four two hundredths O. D. and twenty thirtieths O. S. Fundus examination O. D. Disseminated Chorio Retinitis involving the maculea. O. S. small areas of Chorio Retinitis.

In case No. 1, as shown in the history had a positive Wassermann reaction, case No. 2 had a negative Wassermann and negative spinal fluid. In all cases of suspected syphilis of the eighth nerve, particular those with negative Wasserman should have a careful examination of the eye grounds. Eye condition in the second case was a great aid in clarifying the diagnosis. The history of these cases clearly indicate the extreme importance of a careful functional and vestibular examination of every case of deafness before resorting to any local treatment as both patients had been treated by various means for middle ear conditions. One point of particular interest in these cases is that their labyrinths do not functionate, yet they only have slight disturbance of equilibrum. This is due to compensation on the part of the muscle and sight sense. If any benefit is to be derived from treatment in these cases the diagnosis must be made early.

612 MacBain Building.

CHANGE IN MODEL.

DR. EUGENE R. CARPENTER, Dallas, Texas.

The original instrument, known as Carpenter's Tonsil Knife and Dissector, has undergone various unauthorized changes by different manufacturers during the last twelve years, and the requirements of a tonsil knife have changed materially in the meantime. Due to these facts, I have had the instrument reconstructed by V. Mueller and Company, as shown in the accompanying cut.

The original model was intended to be used for the complete dissection of the tonsil, but possibly 75 per cent of the tonsil operations are now done by combined dissection and the wire snare. The new model meets the modern requirements of a tonsil knife and dissector, as well as a retractor, much better than the old one, which is used yet extensively in spite of its defects.

S. W. Life Building.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON RHINOLOGY AND LARYNGOLOGY.

March 22, 1922.

(1) Pachydermia Laryngis. (2) Mucocele of Left Frontal Sinus. Dr. Harmon Smith.
(To be published in a subsequent issue of THE LARYNGOSCOPE.*)*

(a) Laryngectomy. (b) Cleft Palate. Presented by Dr. John A. MacKenty.

Dr. MacKenty exhibited three cases of laryngectomy. The object in exhibiting these cases was to show the difference between the one stage and the two stage operations.

In the two stage operation, the tracheal opening was collapsed and the patient had to wear the canula. In the one stage operation, the mouth of the trachea was rigid and the canula could be dispensed with. Dr. MacKenty considers this an important factor since the continuous wearing of the canula always causes a certain amount of tracheal irritation.

One of these cases was treated by radium before the operation. The radium was injected and produced a very severe reaction, causing the laync to entirely close and causing an abscess in the center of the burn. The patient was dying of septic absorption and his weight was reduced to 111 pounds and he had been running a temperature for several weeks. The larynx was removed in May, 1921, and the patient made a good recovery. At the present time his weight is 210 pounds.

Examination of the larynx showed that there were active cancer cells in spite of the tremendous dose of radium.

Dr. MacKenty also showed a cleft palate case done by his method which is a modification of the original Langenbeck operation. There are two principles underlying this operation. First, the prevention of tongue pressure by the use of an obturator secured to the teeth or to the gums and the second, the prevention of tension on the soft palate during deglutition by the use of a lead band placed as far external to the center of the palate as possible. By this method the percentage of unions has been materially increased.

DISCUSSION.

DOCTOR HARMON SMITH said that the remarks of Doctor MacKenty concerning the case that he had referred to him, that the patient had had laryngeal cancer for over a year might be misleading, as the patient had not come under observation until a short time before Doctor MacKenty had operated, although he had unquestionably had the cancer for a much longer time.

DR. MCCULLAGH said that he had used the obturator devised by Dr. MacKenty in several cases of cleft palate, in one case with the lead band, and both were valuable aids in securing union in these cases.

DR. DUNCAN MACPHERSON said that congratulations were due to Dr. MacKenty for his unusually satisfactory results So far as he knew, they were the best so far obtained by any one. Some years ago, Dr. Chevalier Jackson was able to show twelve living patients from whom the larynx had been removed for malignant growth. In his opinion, Dr. MacKenty was obtaining a higher percentage of recoveries.

DR. LESHURE stated that the results in Dr. MacKenty's case of cleft palate were so excellent that the Section would be greatly interested in a description of his operation.

The model being passed about demonstrated a number of new features, especially the device for protecting the soft palate.

Failure to protect the suture line is the chief cause of failure of the operation.

He inquired whether Dr. MacKenty found it necessary to approximate the two halves of the superior maxilla according to the method of Brophy in young children.

A number of operators are opposed to this procedure, believing that it often results in mal-occulsion.

Persistent Sinus Following Thyroid Puncture.* E. V. Hubbard, M.D.

I am showing this patient to illustrate a wrong method of treating thyroid tumors The patient is forty years of age and a house cleaner. About seven months ago she presented herself to a surgeon for treatment for a slight central swelling over the thyroid, described as the size of a peach pit. Whether the thyroid gland was involved in this tumor I cannot say. A puncture of a cyst with a trocar and canula resulted in an outflow of watery fluid, according to her description. The tumor subsided and the flow continued. Some four months ago she came under our care at the Manhattan Throat Hospital. There was a raw surface, 1 cm. in diameter at the side of the orignal puncture and a watery fluid continued to exude. There was no tumor and no pain. The patient being in very poor physical condition and having developed, recently, carbuncles in the lateral region of the neck and right axilla which required incision and drainage, operation on the original sinus was postponed until her health could be somewhat improved. About a month after her first visit to the Hospital, introduction of a silver probe showed a sinus 2 cm. or more in depth. Under ether anesthesia a small semi-lunar (Kocher) incision was made, revealing a fibrous-walled chronic sinus leading into the thyroid gland. An effort was made to remove the fibrous tissue and to obtain a clean wound, which latter was closed with deep and subcutaneous sutures. After one week the wound broke down and the discharge recommenced. With applications of silver nitrate, in varying strengths, we have caused the wound slowly to decrease in depth to its present condition. Some months will have passed before healing is complete. The discharge is slowly decreasing. For the secondary septic condition resulting in carbuncles, she has been given regularly an autogenous vaccine. As she appears now, her health is greatly improved and she has gained considerably in weight. This is one of many patients, illustrating what seems to me should be a fixed principle in the treatment of thyroid, or supposedly thyroid, tumors. Under no circumstances should puncture and aspiration be attempted, leading as they do to the formation of a chronic sinus. Generous incision and thorough removal of the tumor, whatever its nature, being in my judgment, the rational and correct procedure.

In response to a question whether this might have been a branchiogenetic cyst, I may say that it showed no evidence of being such and the central position of the original tumor is anatomically against such a supposition.

As to testing for thyroid elements, I may say that our pathologist reported that no chemical method would reveal its thyroid or non-thyroid nature.

Laryngitis Sicca. Dr. David H. Jones, New York.

E. S., a widow, 57 years of age. She had had no serious illnesses and was the mother of five children, the youngest 17 years of age. She had had no miscarriages. She had suffered from difficult nasal breathing as long as she can remember, and always had a large amount of crusts and discharge.

In 1919, she had a severe cold, followed by hoarseness and loss of voice for three or four days, and the symptoms would clear up after she expectorated dry crusts. Was awakened from sleep by an attack

of dyspnoea lasting half an hour, and after coughing was relieved; two days after, had another attack, and two weeks later came to the dispensary with very marked dyspnoea, so severe that all preparations were made for a tracheotomy, but after clearing out the crusts the symptoms subsided. With attack she had some temperature.

Examination of nares showed small anterior nares filled with crust and discharge.

Tongue: Atrophic pharyngitis.

Larynx: Epiglottis and arytenoids red and congested, and between vocal cords was a stringy mass which vibrated back and forth with inspiration and expiration; on removing this crusting was found on the cords extending down the sides of the trachea. After removal of this mass the breathing became easier.

Wassermann reaction: four plus.

The patient was presented for advice as to treatment. She had had twelve salvarsan and mercury treatments, and had been on mercury and potassium iodide treatment constantly for the past two years, but the Wassermann reactions were still positive and the condition did not seem to improve. Strict attention had been given to catharsis during all this time.

DISCUSSION.

DR. HAYS said it was not uncommon to have patients complain of a hoarse voice and to find dried, hard mucous on the vocal cords. He was inclined to believe that the laryngitis was secondary to a pharyngitis and, often to a definite, diseased condition of the nasal sinuses, giving rise to the formation of a great deal of mucopus which constantly clung to the pharyngeal wall and often dropped down into the larynx, where it became dry and hard.

This condition, Dr. Hays said, is not an infrequent accompaniment of atrophic rhinitis and in many instances can only be relieved by a change in climate. He then cited the course of events in an old patient of his who came to him at least twelve years ago with a very severe atrophic rhinitis with the formation of huge crusts and the dripping of pus from the naso-pharynx from a chronic suppurating sphenoid. Every conceivable form of treatment was tried on her, even to paraffin injections under the mucosa and the displacing of the septum to the larger side. The chief complaint of the patient was the dry laryngitis and aphonia. The patient would be entirely relieved by a change in climate and was eventually cured by the administration of a proper vaccine

This patient, like many others, was in the habit of douching her nose three to four times a day with a hot saline solution. Dr. Hays said he was inclined to believe that such douching tended to aggravate the symptoms unless it was followed by a thorough application of some oily medicament. These patients should be instructed to insert small pieces of cotton immersed in liquid albolene into the nose every night and should make applications of liquid vaseline to the pharynx and larynx at frequent intervals.

DOCTOR HARMON SMITH, on Doctor Jones' case, said that he wished to agree most heartily with what the previous speaker, Doctor Hayes, had said in regard to the treatment of laryngitis sicca, that unquestionably too much irrigation dried out the parts rather than accelerated the mucus flow of what remained of the mucous glands. That recently he had benefitted these cases by forcing into the tissues, under pressure by employing his sinus syringe, an iodine solution, preferably Mandles Solution diluted half. He, likewise, had recommended to a number of his patients the employment of olive oil by filling the nasal cavity and draining it into the pharynx prior to retiring each night. The oil had been of marked benefit in all of these cases.

Ulcerative Keratitis and Iritis Due to Hyperplastic Ethmoiditis. Dr. S. M. McCullagh, New York.

T. J., male, 38 years old, was referred to my Clinic, November 19, 1921, from the Eye Clinic of Dr. E. S. Thompson by Dr. L. W. Crigler.

He had been under treatment three months for an ulcerative keratitis of the right eye and a short time previously the iris had become involved. Treatment failed to check the course of the disease and blindness threatened. He complained of severe pain in the head as well as the eye. The Wassermann was negative.

Three months before the beginning of the eye infection the patient had a slight nasal discharge which ceased entirely one week before his keratitis set in. The nasal examination was negative; the tonsils were small and cryptic; the teeth were in fair condition. X-ray showed frontals, antra and sphenoids clear. The ethmoids showed mild involvement. One tooth showed a suspicious area at apex.

On Nov. 21st, the tonsils were removed under local anesthesia. The pathologist's (Dr. A. A. Eggstein) report on them is interesting, as it seemed to indicate success in our search for the focus of infection. It read, "Specimen consists of two small firm masses of tissue. Sections show hyperplastic lymphoid tissue markedly infiltrated with polymorphonuclear leukocytes. There are areas of leukocytes to the extent of abscess formation in the tonsillar capsule. The fibrous tissue is greatly increased throughout the lymphoid tissue and in the capsule. The mucous glands present show inflammation. No definite tubercules found. Diagnosis: Chronic suppurative lymphadenitis.

The patient apparently received no benefit from the operation as the eye condition progressed.

Chemical analysis of the blood indicated that a focus of infection persisted.

Examination of the stool showed protein putrefaction.

Dr. H. A. Hougton, the metabolist at the Hospital, stated that, in his experience, such eye lesions were due to carbohydrate fermentation, and felt that no benefit would result to the eye from treatment of the intestinal condition and recomdmended operation upon the ethmoids.

Repeated nasal examinations failed to reveal any findings that would direct suspicion to the sinuses as the cause of the trouble.

I was extremely reluctant to operate upon the ethmoids and held out scant hope of relief to the patient. He was insistent upon taking the chance, so on Dec. 6th, I did an exenteration of the right ethmoids and opened the right sphenoid. No gross change was visible and the whole tract appeared normal. Immediately upon the termination of the operation he made the statement, "You have hit the spot. My head feels better already."

The pathological report on the removed tissue from the ethmoid region was chronic fibrosis with bone thickening.

Improvement following the operation was immediate. Relief of the pain in the head was almost instantaneous. Within two weeks all acute eye symptoms had disappeared.

I had hoped to present this patient tonight, but he is out of town.

In a letter dated March 18th, he says: "My eyes are in very fine condition, but the sight is just a bit hazy, otherwise as good as ever."

Eye Complications with Sinus Disease. Dr. Francis W. White, New York.

C. M., 22, United States.

Working Diagnosis: Optic neuritis retrobulbar O. D.

Final Diagnosis: Sinusitis, non-purulent; retrobulbar optic neuritis, right.

Onset: On March 26, 1921, a sudden blurring of vision.

Nose and throat examination shows a deviated septum to the right.

Eye examination shows optic neuritis, upper and outer side of disc, and hyalitis o.d.

X-ray, April 11, 1921, shows sinusitis practically clear Possibly some granulations and inflammatory condition in ethmoid cells.

Bacteriological spreads from right sphenoid, shows a few pus cells, and few gram positive diplococci. Culture shows non-hemolitic streptococci.

Treatment operative, April 18, 1921. Submucous resection of the nasal septum and ethmo-sphenoidectomy right (Dr. White). Thin watery fluid in sphenoid, hyperplastic ethmoids.

Clinical Data: April 16, 1921, v.o.d. fingers at 2 feet, v.o.s. 20/15. April 30, 1921, v.o.d. 20/50, v.o.s. 20/15. March 12, 1921, v.o.d. 20/100 (under mydriatic), v.o.s. 20/30. March 21, 1921, v.o.d. 20/50††, v.o.s. 20/15. June 4, 1921, v.o.d. 20/20, v.o.s. 20/15. August 4, 1921, v.o.d. 20/20, v.o.s. 20/15. September 30, 1921, v.o.d. 20/20†, v.o.s. 20/15, sphenoid opening clear and healed.

Discussed by Drs. Hays, Smith, Kelly and McCullagh.

P. D., 46, Austria.

Working Diagnosis: Paralysis 6th cranial nerve left, and partial paralysis 3rd cranial nerve left.

Final Diagnosis: Left ethmo-sphenoiditis, purulenta and paralysis as above noted.

Onset: A sudden onset of double vision and inability to move left eye toward left.

Pain: A sharp pain frontal and temporal at the top of head for three weeks.

Discharge: Profuse nasal discharge at time of pain, also sneezing, but sense of smell not affected.

Respiratory Tract: Negative.

Nose: Throat examination shows hypertrophy of both inferior turbinates. Cystic middle turbinates, and polypi in both naries.

Eye examination shows paralysis of the 6th cranial nerve left, and partial paralysis 3rd cranial nerve left.

X-ray shows fronts clear, left ethmoid moderately involved, and right ethmoid mildly involved. Left antrum moderately involved, and right antrum mildly involved. Sphenoids moderately involved.

Transillumination: Negative.

Blood test was negative (Wassermann).

Treatment operative, September 21, 1921, left ethmo-sphenoidectomy (Dr. White). Thin pus in ethmoidal labyrinth and sphenoid.

Clinical data, September 25, 1921, the eye condition improved. Left eye can be moved to left until right margin of cornea is at center of orbit, also seeing better and double vision not so marked.

September 27, 1921, diplopia is still present vertical and horizontal, but not so marked. The left optic nerve is nearly normal in color, and ptosis nearly gone; v.o.d. 20/30, v.o.s. 20/30 (Dr. Irwine).

September 30, 1921, examination on discharge from hospital shows diplopia to the left (extreme field). No vertical diplopia, although left eye lags in moving downward. Headaches have disappeared, and the nasal discharge is less.

I selected these cases for presentation to show, both suppurative and non-suppurative forms of sinusitis complicated by ocular conditions.

It will be of interest to all of us and to me particularly, to hear from Dr. Hays, the result in the case to which he has just referred. I heartily agree with Dr. Smith that the prognosis in the eye condition is dependent upon the length of time the eye complication has been present, for the longer the complication has been present, the more unfavorable the prognosis. This obtains in both the non-suppurative as well as in the suppurative form of sinusitis. In the non-suppurative form, we are very dependent upon the aid of the oculist, both from the standpoint of diagnosis and whether operative procedure shall or shall not be instituted. In reply to Dr. Kelly, I would say that no matter who operates in a particular case, a very pronounced reaction may occur. This is a very important point, for if in a given case the eye complication is on the borderline of being favorably or unfavorably modified by operation on the sinuses, and an inordinate reaction occurs, the result, no doubt, will be unsatisfactory. Another point is that if we are to continue to operate in the oculo-sinus cases, it must be done early and with as little trauma as possible. I also think that we are going to modify our technique

considerably, and not do as extensive exenterations except in the suppurative form.

DISCUSSION.

DR. HAYS was glad that this subject had again been brought to the attention of the Section. Dr. White's cases were exceedingly interesting and comparable to a number of cases of his own. As short a time as a year and a half ago, a paper was read at the Academy of Ophthalmology and Oto-Laryngology, in Kansas City, and the statement was made that there were many eye lesions of severity, mainly optic neuritis or retrobulbar neuritis, which were due to an obscure sinus condition which was not demonstrable by intranasal examination or by X-ray pictures. Dr. Hays said that, at that meeting, he took exception to wholesale operations on the sinuses, but since then he had changed his mind, particularly after reading of marvelous recoveries from blindness by operating on the sinuses. In his own practice, he had a number of cases referred to him by eye-specialists, whom he operated upon, by his painless and bloodless method, in which the results were very gratifying. Many of these cases, Dr. Hays said, are referred by an eye specialist, and on his advice alone the operation must be performed. In other words, it is not what the rhinologist finds, but what the ophthalmologist finds. For often, the mere opening up of the ethmoid and sphenoid cells, giving proper aeration, by relieving the venous engorgement, is enough to effect a cure.

Recently, Dr. Hays said, he had operated upon a young girl who, within the course of a few weeks; became totally blind due to a retrobulbar neuritis. A complete exenteration of the ethmoid and sphenoid cells was performed. Within three days the sight began to return in the right eye and a pupillary reflex was demonstrable in the other eye. Of particular interest to him was the case of paralysis of the third nerve, cited by Dr. White. For at the present time he had such a case in the Hospital and had hesitated to operate upon the sinuses, as he could not work out the association of the third and sixth nerve with the sinuses. However, after Dr. White's experience, he said he felt inclined to perform an exploratory operation

One word more in closing. Operations of this kind are essentially major operations and should only be performed in a well equipped hospital. Moreover, the patient should remain in the Hospital for a sufficient length of time to demonstrate the possible effect upon the eye condition.

DOCTOR HARMON SMITH said that while the majority of these cases having come under operation had been successful, he had recently had two cases referred to him by Doctor Reese where in one—an adult—the condition had existed for some time and that the examination of the nose showed polypoid degeneration of the middle turbinate and a few isolated polypi in the middle meatus; no free pus was found at the time of operation. There had been no improvement following this procedure. The oculist concluded that the lesion had existed too long to expect benefit therefrom.

The second case was in a young girl, who had been treated for retrobulbar neuritis for a year before coming to Doctor Reese. Exenteration of the ethmoid and sphenoid showed free pus on one side and granulations on the other, and in his experience this was the only time wherein he had found free pus in operations upon cases of this nature. The girl improved somewhat, but did not regain complete sight, as would unquestionably have obtained had the operation been performed sooner. He further believed that in the majority of cases that depletion will, by the mere removal of the middle turbinate, bring about as favorable a result as a complete exenteration of the ethmoidal and sphenoidal tract.

DR. JOSEPH D. KELLY cited two cases which were operated on for papilloedema which did not respond as far as eye symptoms were concerned for operation.

The first was a young girl, nineteen years of age, who had lost the sight of her right eye with a final diagnosis of sphenoid and ethmoid

disease, and later began to have symptoms in the left eye. He operated upon her in July, 1921, completely exenterating the ethmoid and opening the sphenoid, with the result that the patient became progressively worse, altering in the vision of the left eye from 20/30 to 20/70, and finally remaining at 20/50. When the patient was last seen there was no definite improvement beyond the 20/50 mark, although there had been a complete operation done.

The other case was that of a Polish miner who had a sudden loss of vision with no preliminary symptoms. He reported to his local specialist, who, after making an examination, advised him to come to New York City to some relatives, and he reported to the Manhattan Eye and Ear Hospital for treatment. Dr. Curtin made a thorough investigation of the case and concluded that it required a sinus operation. At the time of operation, the patient had a choked disc of 3 diopters in both eyes. The first operation was performed in the early part of August, at which time the right ethmoid labyrinth and the sphenoid were opened. A week later the left one was opened. The man did apparently well for two weeks, after which time he showed no further improvement.

Dr. Kelly said that these cases were not cited for any criticism of the results obtained by Dr. White and Dr. McCullagh, but with a hope that some light might be thrown upon the etiology of the cases which did not respond to the sinus operation; yet which were clinically the type of case that should respond.

DR. MCCULLAGH said that he had had the privilege of watching Dr. White's cases during their treatment and had already had occasion to congratulate him on their happy outcome.

There is no class of cases in which the results are more gratifying, both to the patient and to the surgeon, than these cases of retro-bulbar neuritis due to sinusitis, when they are operated upon in the early stage.

He felt that early operation is imperative and in the cases due to hyperplastic sinusitis I operate with no other indication than the statement of a competent oculist. The case of destruction of the highly specialized optic nerve does not, in my opinion, justify an hour's delay, nor should the occasional cure by conservative treatment lure us into procrastination. Compared with an assured blindness the operative risk —in competent hands—must be regarded as negligible.

Epithelioma of Frontal Sinus and Ethmoids. C. W. Byrd, New York.

Case of Nathan Kaplan, Russian Jew, aged 53. Occupation, peddler.

Family History: Five brothers, two sisters. History, negative.

Previous History: Has had frequent colds and frontal headache for the past two years. He consulted his family physician for impaired vision and was referred to a specialist, who performed an intra-nasal operation, breaking into the ethmoid region on either side. This operative procedure occurred seven weeks prior to the time he came under my observation.

Present History: Patient was first seen by me August 6, 1920, when he complained of severe frontal headache and impaired vision on the left side. Anterior rhinoscopy showed the left middle meatus to be filled with pus and with granulations which bled easily. The inferior turbinate was pale and boggy. On the right side the middle turbinate showed polypoid degeneration, there was pus in the middle meatus and the inferior turbinate was pale and boggy. Posterior rhinoscopy showed a purulent discharge covering the choanae and naso-pharynx, with polypoid degeneration of the posterior ends of the turbinates. There was tenderness over the frontal region of the left side, also orbital cellulitis with proptosis and limitation of movements. He could count fingers at four feet and ophthalmoscopic examination revealed papilledema with engorgement and tortuosity of the retinal veins.

Transillumination showed both frontal sinuses, the antra and ethmoids darkened, more so on the left, with absence of right reflex on the left.

X-ray showed both frontals large and deep, containing granulations or pus. Both ethmoids contain granulations or pus, especially the left. Granulations or pus in the antra.

Wassermann, negative.

Operation was performed on August 19th. A regular Killian skin incision was made on the left side. The periosteum was elevated over the region of the left frontal sinus and as the elevation was continued toward the orbit there was found necrosis of the superciliary ridge and the floor of the sinus, with free pus between the roof of the orbit and the periosteum. Upon reflecting the periosteum over the lacrymal bone and nasal process of superior maxilla, and continuing it over the inner orbital wall there was found necrosis of the inner orbital plate. The anterior wall of the left frontal sinus was removed and the sinus was found filled with friable granulations and pus. Hemorrhage was severe and difficult to control. After all granulations had been cleaned out there was found necrosis of the posterior wall in two places, each about the size of a quarter, with granulations on the dura. Upon investigating to find the partition between the sinuses, it was found to be absent, having been destroyed by bone necrosis, and the right frontal sinus was filled with granulations and pus.

Incision was then continued across the root of the nose and through the right brow. The anterior wall of the sinus was removed and the contents thoroughly cleaned out.

Next, the contents of the left orbit were retracted, the inner orbital plate removed and also the roof of the orbit. The lacrimal and nasal process of superior maxilla were partially removed over the ethmoid region. The middle turbinate was removed, the ethmoid cells exenterated and the sphenoid opened. A large cigarette drain was then placed through the left side of the nose into the frontal sinus and then both sinuses were packed with iodoform gauze and left partially open.

On account of the severe hemorrhage and the suspicious character of the material removed, a specimen was sent to the pathological laboratory. The report was as follows:

"Specimen consists of five irregular, friable masses of tissue, each measuring 1.5 to 1 cm.

"Sections show irregular masses and strands of epithelial cells that form no definite histological structure. Many of the cells show mitotic figures and many are necrotic and stain very poorly. The cells are rather large and contain reticulated nuclei.

"Diagnosis: Carcinoma."

The progress of the case was apparently favorable, both sides filling in with granulations, vision was improved, and pain relieved for a time.

In October, 1920, the patient returned complaining of severe pain over the right frontal region and impaired vision of right eye. On examination I found the right frontal sinus filled with a hard nodular mass that was very tender on pressure. Rhinoscopic examination showed the right superior meatus filled with a granular polypoid mass which bled profusely on the slightest touch, and hemorrhage was difficult to check. Examination of left frontal and left side of nares revealed apparently healthy sinuses with no recurrence of growth.

Pain at this time was unbearable and hemorrhage frequent and difficult to control. The patient was sent to Memorial Hospital for radium treatment. The first application relieved the pain and controlled the hemorrhage. The patient has now had six applications of radium over a period of eight months. The growth has disappeared and the sinuses on right side are apparently healthy.

DISCUSSION.

DR. MCCULLAGH said he had seen the case and considered the result a very successful demonstration of the power of radium in the cure of malignancy.